PGW2200软交换机RLM计时器信息

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目录

简介

本文为发信号模式提供一用于Cisco PGW 2200的Redundant Link Manager (RLM)的概述和配置示

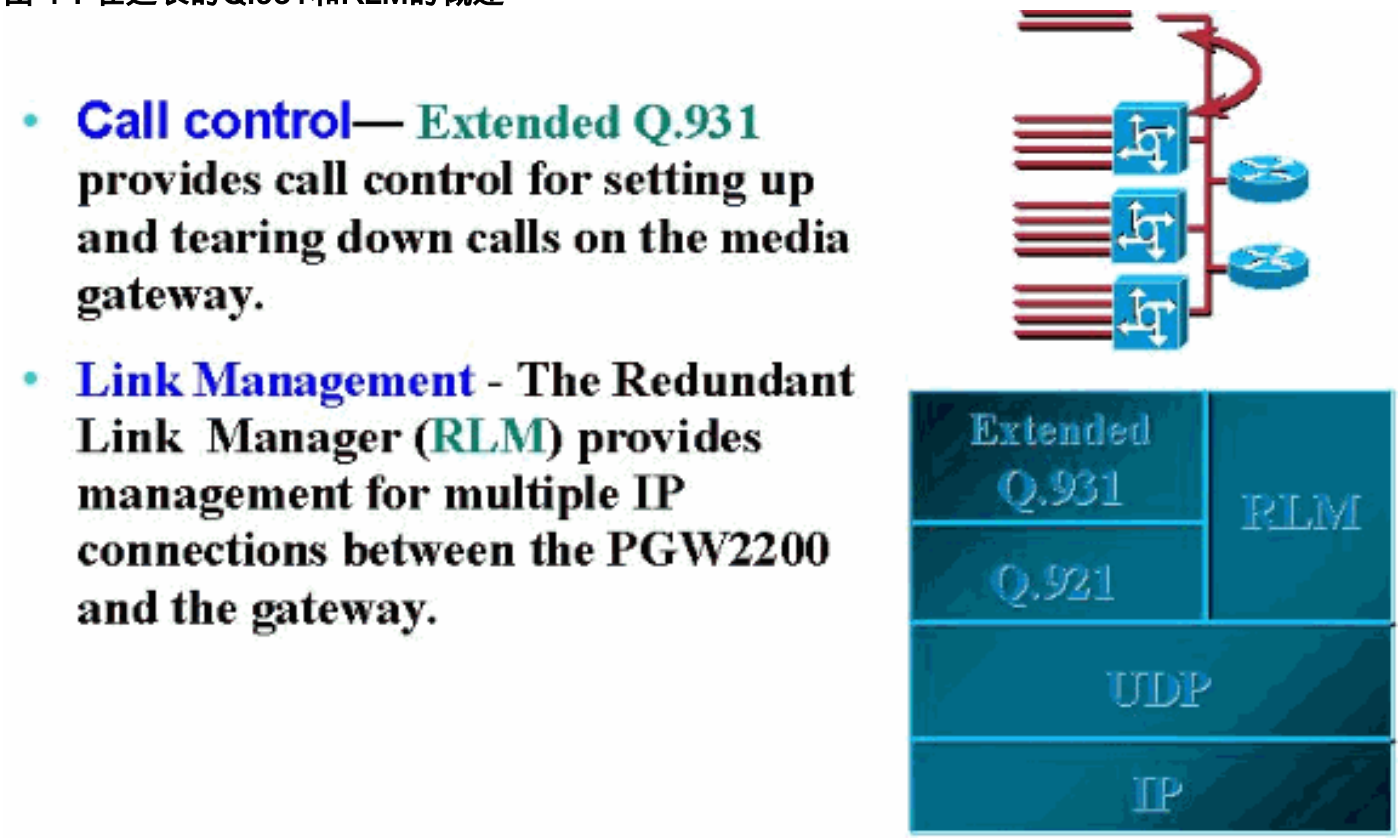
例。信息在排除故障也被提供RLM信令和ISDN信令在网络接入服务器(NAS)网关和Cisco PGW 2200之间。

RLM提供在多个IP网络的虚链路管理，以便思科Q.931+信令协议可以传输在多条冗余链路顶部在Cisco PGW 2200和Cisco NAS之间。

RLM提供：

- **客户端/服务器关系**—，当失败检测时， NAS RLM总是客户端和交换机A链路。
- **轮询机制**—周期地发送“Hello”在所有配置的链接保证可用性。
- **保存链路完整性**—控制消息是在同样IP地址对的交换的out-of-ban。然而，使用不同的UDP端口。
- 冗余的IP连接。
- 消息针对的服务。
- 可靠性和性能。

图 1：在延长的Q.931和RLM的概述



先决条件

要求

Cisco 建议您了解以下主题：

- 冗余链路管理器
- RLM配置
- Cisco Media Gateway Controller Software版本9文档

使用的组件

本文档中的信息根据Cisco PGW 2200软件版本9.x。

注意： RLM详细信息是Cisco PGW 2200版本7.4(11)和7.4(12)的一部分。然而，本文为Cisco PGW 2200版本9.x只提供指南。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

RLM计时器信息

一RLM组在网关配置，并且两Cisco PGW 2200s在RLM组内配置。一有IP地址，并且活动Cisco PGW 2200和其他的UDP端口有IP地址和暂挂Cisco PGW 2200的UDP端口(请参见图2)。

每个服务器在RLM组中由在不同的UDP端口的两个UDP信道支持。一个UDP信道(端口3000)传输RLM协议和另一个UDP信道(端口3001)传输Q.921协议。

- RLM目标将绝缘从网络工作情况的不确定的本质的呼叫信令层典型地关联与基于的IP网络。RLM维护Cisco PGW 2200和远程NAS之间的多种虚链路和不断地监控链路状态确定流出的帧应该是否假设备选路径。
- 因为每另外RLM组需要约束到Cisco PGW 2200频路控制点(IOCC) (为其中每一要求的特定UDP端口)，多个IOCC要求支持此配置。虽然Cisco PGW 2200可以支持八个主速率接口互联网协议(PRIIP) IOCC，其中每一与32个网关(RLM)或每Cisco PGW 2200的IOCC (PRIIP)产能支持32个网关(RLM)。这意味着在Cisco PGW 2200，您有端口3001， 3003和3005至3015。请使用unix命令**netstat-a|验证此的grep 30**在Cisco PGW 2200。

信息从在目录/opt/CiscoMGC/etc下的XECfgParm.dat文件：

- *.maxNumLinks = 32
- *.maxNumRLMPorts = 8 #唯一RLM端口最大

PGW2200支持最多八PRI频路控制点进程。当您配置PGW2200时，这些进程创建。例如，您在您的Cisco IOS/PGW2200配置方面使用端口3000和3001， RLM和ISDN。这创建PRI的(NI+)一IOCC。所以，在您使用一个不同的端口时候另一进程创建。

每进程支持32个网关。如果使用每个网关一RLM，则您能有256个网关。但是，当您有四RLMs每个流量路由的时网关，然后您留下与64个物理网关产能。

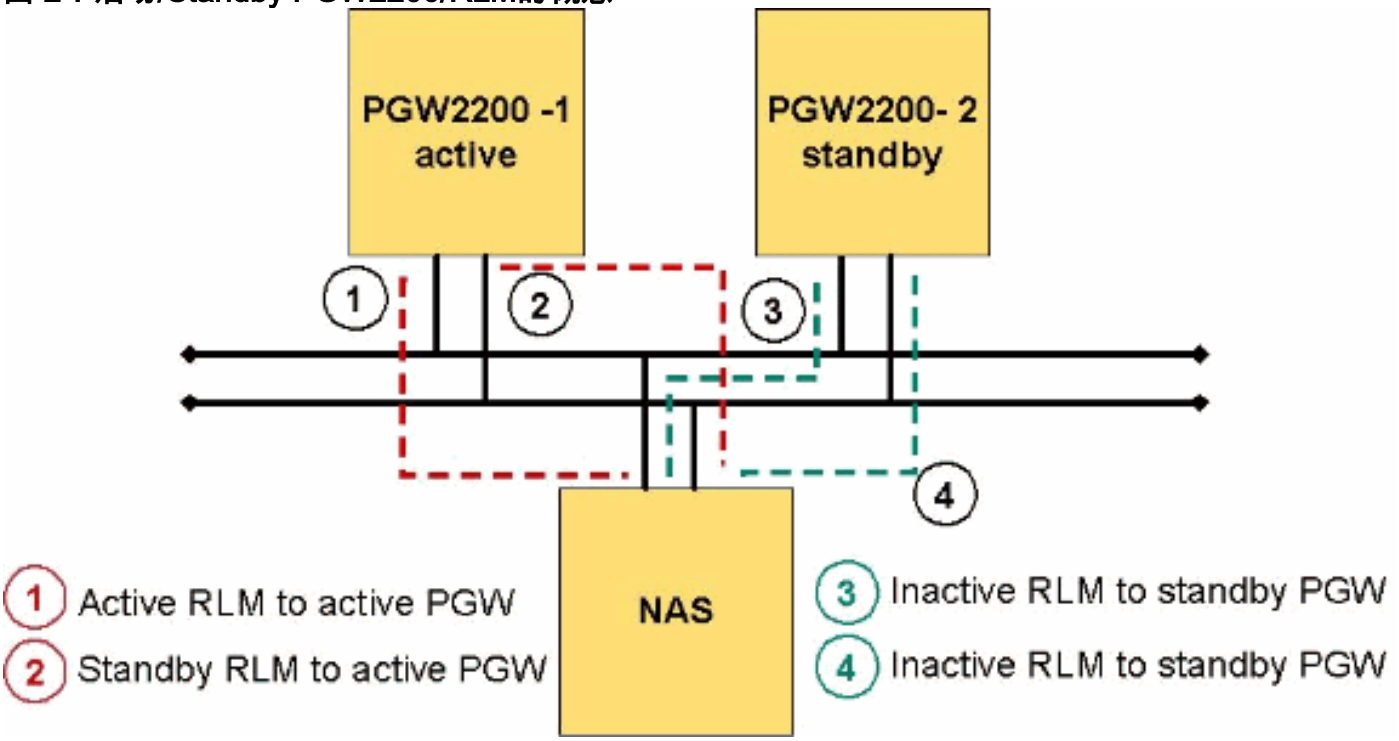
注意： IUA使用从Cisco PGW 2200版本9.4或以上支持。因为RLM有限制根据支持很大数量的NFAS组的比例缩放每个媒体网关， IUA的支持与SCTP被限制。IUA的参考的支持与SCTP欲知详情。

注意： 请勿更改此值。并且，请注意，当您增加RLM会话您每Cisco PGW 2200使用，越少量总网关您可以支持。例如，一RLM支持总共256个网关每Cisco PGW 2200，两RLMs支持总共128个网关每Cisco PGW 2200，等等。

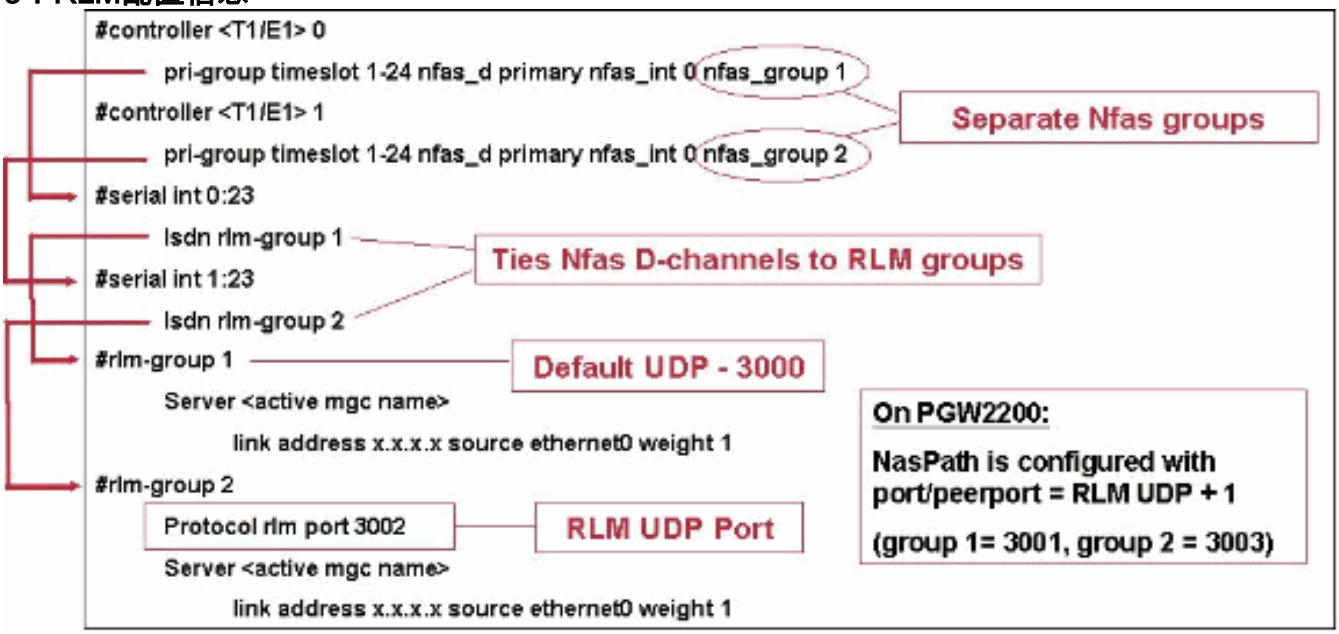
网关认为客户端并且对一个切换的鼓动负责对一条更低权重暂挂RLM链路的在失败情形下。

概述和验证

图 2：活动/Standby PGW2200/RLM的概念



- RLM管理链路的默认的UDP端口是3000。
- RLM数据链路的默认的UDP端口是一个加上RLM管理链路UDP端口值的值(例如， 3001)。**图 3：RLM配置信息**

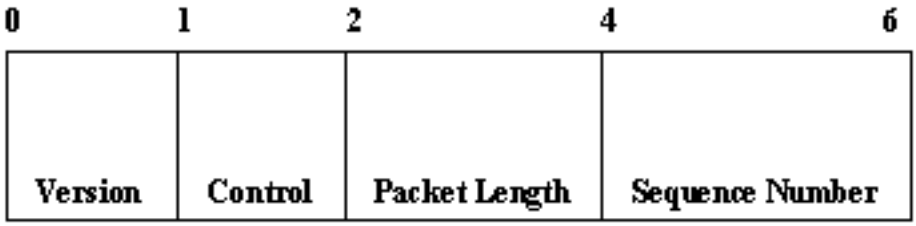


- IOS show rlm group x命令和**显示ip插槽**显示UDP端口在使用中在IOS NAS。
- 在E1/T1控制器的**nfas_int**在Cisco PGW 2200承载信道配置里*必须*匹配spanID。这是在信道映射的一个关键点。它在Q.931设置信息的ChannelID IE传输与时隙一起。

RLM如何工作

RLM数据包格式和协议栈

当此图表显示， RLM链路管理信息包包括六个字节。



RLM当前支持的版本在PGW2200的是仅版本2.0。

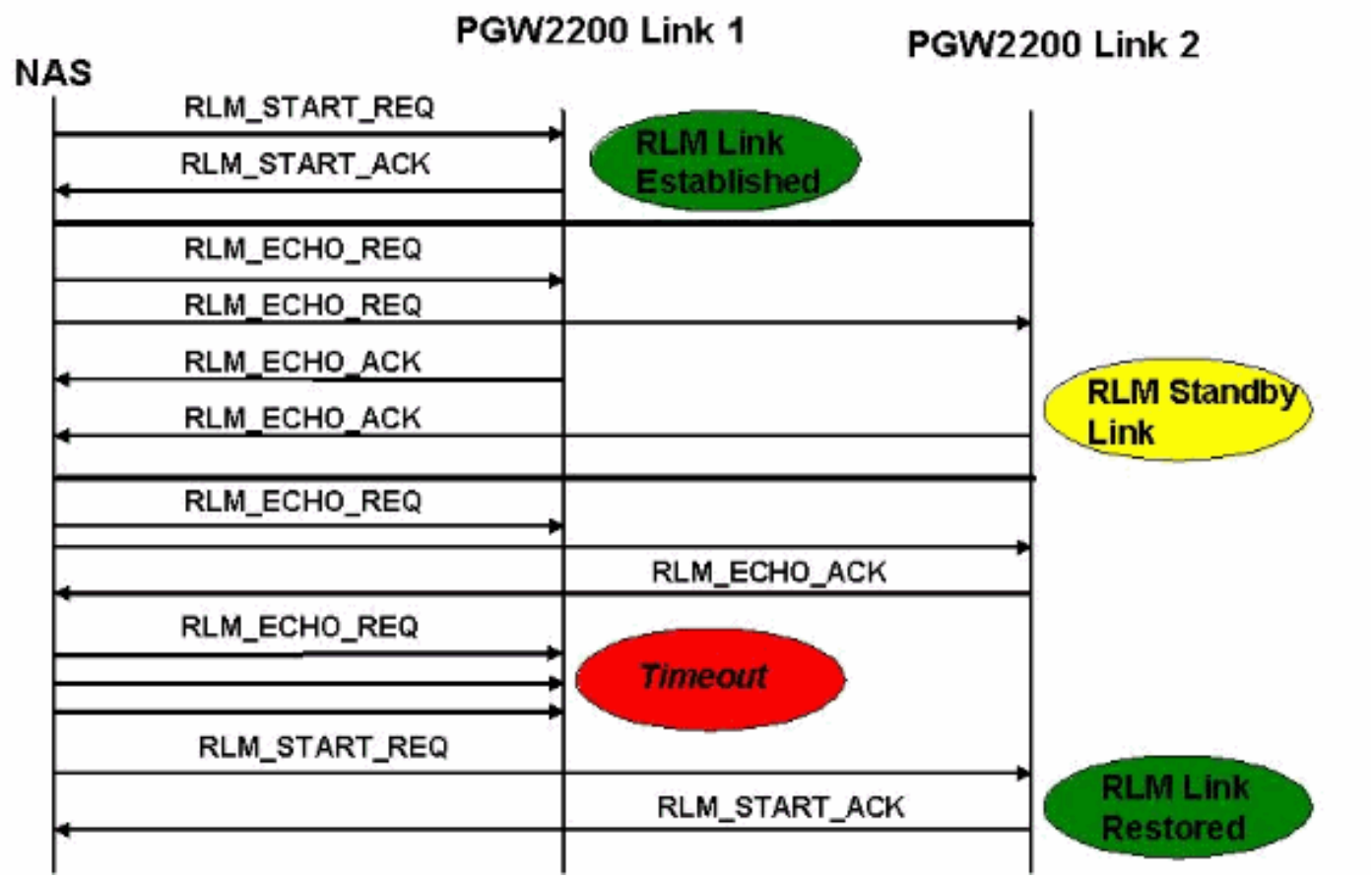
控制字段提供命令给对等体。这些是有效控制值：

- **RLM_START_REQ (0x01)** —用于启动RLM链路。只生成由NAS。
- **RLM_START_ACK (0x02)** —生成由PGW2200确认RLM链路的开始。
- **RLM_STOP_REQ (0x03)** —生成由PGW2200或NAS终止链路。
- **RLM_STOP_ACK (0x04)** —对Stop请求的确认。
- **RLM_ECHO_REQ (0x05)** —用于由NAS周期地只**ping** PGW2200为了验证链路完整性。使用在活动链路和所有备用链路。
- **RLM_ECHO_ACK (0x06)** — ECHO请求的确认。
- **RLM_SWITCH_REQ (0x07)** —用于从一条更低被衡量的活动RLM链路转换到一条更高的被衡量的可用的链路。
- **RLM_SWITCH_ACK (0x08)** —交换请求的确认。

数据包长度是RLM管理信息包(UDP有效负载)的长度。对于RLM版本1.0，此值总是6。对于RLM版本2，此值是8。

序号是用于的一个唯一值关联一特定订单请求和确认。

图 4：林克恢复的RLM消息流



在NAS的表4，客户端RLM启动请求到Cisco PGW 2200启动RLM会话。假设NAS配置给第一条链路更加高优先级。在Cisco PGW 2200确认Start请求后，链路被认为可利用，并且数据包在数据UDP端口可以被发送。第二条链路在备用模式安置。RLM在一给的RLM组中周期地发送ECHO请求对所有已配置的RLM链路。默认间隔是1秒。

关于超时问题在表4，如果活动链路不收到答复到其中一个RLM ECHO请求，它尝试重试请求(默认值是三尝试)。在疏忽收到确认，客户端RLM通过发送Start请求启动链路恢复对下高被衡量的备用链路联机。客户端RLM继续轮询以前激活的链路。如果答复最终接收，执行一个链路切换回到更高的被衡量的链路。如果链路权重是相同的， RLM客户端选择开始确认是接收的第一的链路。对于暂挂Cisco PGW 2200， RLM服务器不确认从NAS的ECHO请求，而在备用状态。一旦待机变为活动服务器，并且所有呼叫状态恢复， RLM开始确认请求从NAS。

RLM行为是这样RLM Keepalive只传送，当信令流量有一段时间了时未传送。例如，信令消息的收据(例如， Q.921)有重置RLM保活计时器效果。也注意RLM Keepalive由NAS只传送。Cisco PGW 2200只回答RLM Keepalive请求。然而，如果RLM保活计时器在Cisco PGW 2200超时，它减少链路。增加在两边的RLM保活计时器值(PGW2200和NAS)保证RLM链路没有重置在期间默认RLM保活计时器值可能是太严密的IP网络的临时状态期间在。对于单个Cisco PGW 2200，没有执行的此补偿。使用两Cisco PGW 2200s在故障切换配置里，有在避免飘荡在RLM链路和快速检测链路故障之间的一个折衷方案。使用RLM，保活计时器和Q.921/Q.931计时器增加。

当您查看控制RLM信息消息(时请参见图5)，控制字段提供命令给对等体。值在表5是有效控制值：

图 5：RLM留言信息

- ***RLM_START_REQ:*** **Used by NAS to initiate an RLM link.**
- ***RLM_START_ACK:*** **Generated by the Cisco PGW2200 to acknowledge the start of an RLM link.**
- ***RLM_STOP_REQ:*** **Generated by either CiscoPGW2200 or NAS to stop a link.**
- ***RLM_STOP_ACK:*** **Acknowledgement to a stop request.**
- ***RLM_ECHO_REQ:*** **Used by the NAS to periodically "ping" the Cisco PGW2200 in order to verify link integrity. Used both on the active link and all standby links. By default it's sent every second if there is no other traffic. Used also by the Cisco PGW2200 at switchover**
- ***RLM_ECHO_ACK:*** **Acknowledgement to an echo request.**
- ***RLM_SWITCH_REQ:*** **Used by NAS to switch from a lower weighted active RLM link to a higher weighted available link.**
- ***RLM_SWITCH_ACK:*** **Acknowledgement to a switch request.**

崔凡吉莱在NAS和Cisco PGW 2200的RLM计时器

此部分设计保留稳定的呼叫在Cisco PGW 2200故障切换期间或在瞬变IP网络不稳定性的情况下。这些更改保证呼叫保留，除非有RLM连接长时期的损耗。RLM连接损耗含义没有运载联机的链路NAS和活动Cisco PGW 2200之间的信令流量。单条链路的损耗由RLM层处理透明地对ISDN堆叠。

用**show rlm group <x>命令**在IOS NAS，您能检查RLM的计时器。

表 1：在Cisco IOS NAS的RLM默认计时器值

计时器	持续时间
打开等待	3 秒
恢复	12秒
最低	60 秒
Keepalive	1 秒
Force-down	30 秒
交换机链路	5 秒
重新传输	1 秒

- force-down时间比总Keepalive时间(保活周期需要长*重试次数)加上恢复时间。例如，请参阅此公式：force-down > (Keepalive *重试次数) +恢复默认情况下重试次数= 3次此示例， 30 > (1 * 3) + 12如果force-down和保活计时器有同一个值，则IOS NAS不能认为链路重置，因为Keepalive是大于或等于强制停工期。
- **保活计时器**— IOS NAS发送ECHO_REQ每1秒。在三丢失ECHO_REQ后， NAS认为链路也许发生故障，并且启动恢复计时器(12秒)。然而，它继续发送预计的ECHO_REQ链路也许恢复。注意此在更旧的Cisco IOS版本，恢复计时器在默认值太长。有RLM链路可能被中断的实例。最好的项目是检查在两个系统的这些计时器。在暂挂Cisco PGW 2200的启动/关闭期间，活动Cisco PGW 2200在其对ECHO_REQ的答复延迟从IOS NAS。在从IOS NAS的三个尝试，其中每一以一秒钟超时默认， IOS NAS减少RLM链路后。通过增加从1秒的保活计时器到10秒，保持活动RLM是可能的。这样， IOS NAS在每ECHO_REQ以后等待更加长在定时前和再尝试。使用10秒Keepalive， IOS NAS能在定时前等30秒和带来在RLM链路下。然而，在此实例中，如果更换保活计时器，您需要采取在force-down计时器的注意。
- **恢复计时器**—如果要降低恢复计时器，请迅速减少活动RLM链路，在Cisco PGW 2200重新启动前。这由配置保活计时器和force-down计时器完成在同样值。所以，当IOS NAS重新加载并且回来时，远程IOS NAS不能认为链路重置，因为Keepalive是大于或等于force-down时间。force-down时间比总Keepalive时间(保活周期需要极大*重试次数)加上恢复时间。更正是force-down计时器必须是更加了不起的然后三倍Keepalive加上恢复计时器。
- **Force-down计时器**—根据规格， RLM留在恢复状态大约15秒(ECHO_REQ编号每1秒加上恢复每12秒)。如果链路不在该时间段内回来， RLM状态去故障状态和被迫坚持下来在30秒作为默认避免乒乓切换技术效果。在那以后，它开始派出Keepalive。两客户端和服务器同时通过此周期。当RLM状态从IDLE去DOWN时，没有需要迫使状态下来，因为已经在故障状态。这意味着，当以太网/快速以太网链路被断开时， IOS的NAS RLM客户端设法恢复链路恢复计时器定义的期限(DEFAULT值等于12秒)。如果它不是成功的，有防止RLM客户端响应的force-down计时器(DEFAULT值等于30秒)，即使以太网链路是UP。在force-down计时器超时之后， RLM客户端开始建立链路用Cisco PGW 2200。在这种情况下您能有42秒(恢复和force-down计时器的组合延迟[12 + 30 = 42秒])。**表 2：**在Cisco PGW 2200 properties.dat值的RLM默认计时器值。[*]是在9.3(2) Cisco PGW 2200版本删除的属性值。**注意：** 当您修改计时器时，在Cisco PGW 2200和NAS之间的不匹配的计时器可以是难诊断。所以，作为一件可操作的事情，推荐使用默认设置，除非有强制原因更改他们。

ISDN Q.921和Q.931+

PGW2200要求提供ISDN在冗余的IP链路的Q.921和NI-2 Q.931连接给多种远程Cisco NAS网关。这些冗余的IP链路由RLM维护。因此，在Time Division Multiplexing (TDM)接口(IMT中继)的所有时隙该运行到NAS里包含仅承载信道。ISDN信令在从PGW2200的IP链路间被传送到NAS网关。每信令

连接包括一个对PGW2200和NAS之间的冗余的IP链路。可以有在每一个或更多信令连接NAS。每信令连接完全控制一套NAS TDM接口作为无设施随路(NFAS)组。

使用传统ISDN信令，每个ISDN PRI电路有(D-channel)用于的一个时隙传送信令。然而，与ISDN NFAS PRI，信令在所有PRI接口的单个D-channel被传送在NFAS组中。这减少为了PRI线路和产量额外的承载信道需要的信令链路数量能将用于数据、语音或者视频。如果主要接口去服务中断，它是可选有在另一个接口的一备份D-channel。在思科的SS7接入服务器和语音网关的互连解决方案，使用ISDN NFAS功能。然而，与SS7实施， ISDN信令信道(D-channel)从PRI接口释放并且重定向到另一个端口(以太网、快速以太网或者序列)。所以，所有PRI时隙不包含承载信道和仅信令。

某些增加的特征增强被做对NI-2协议是：

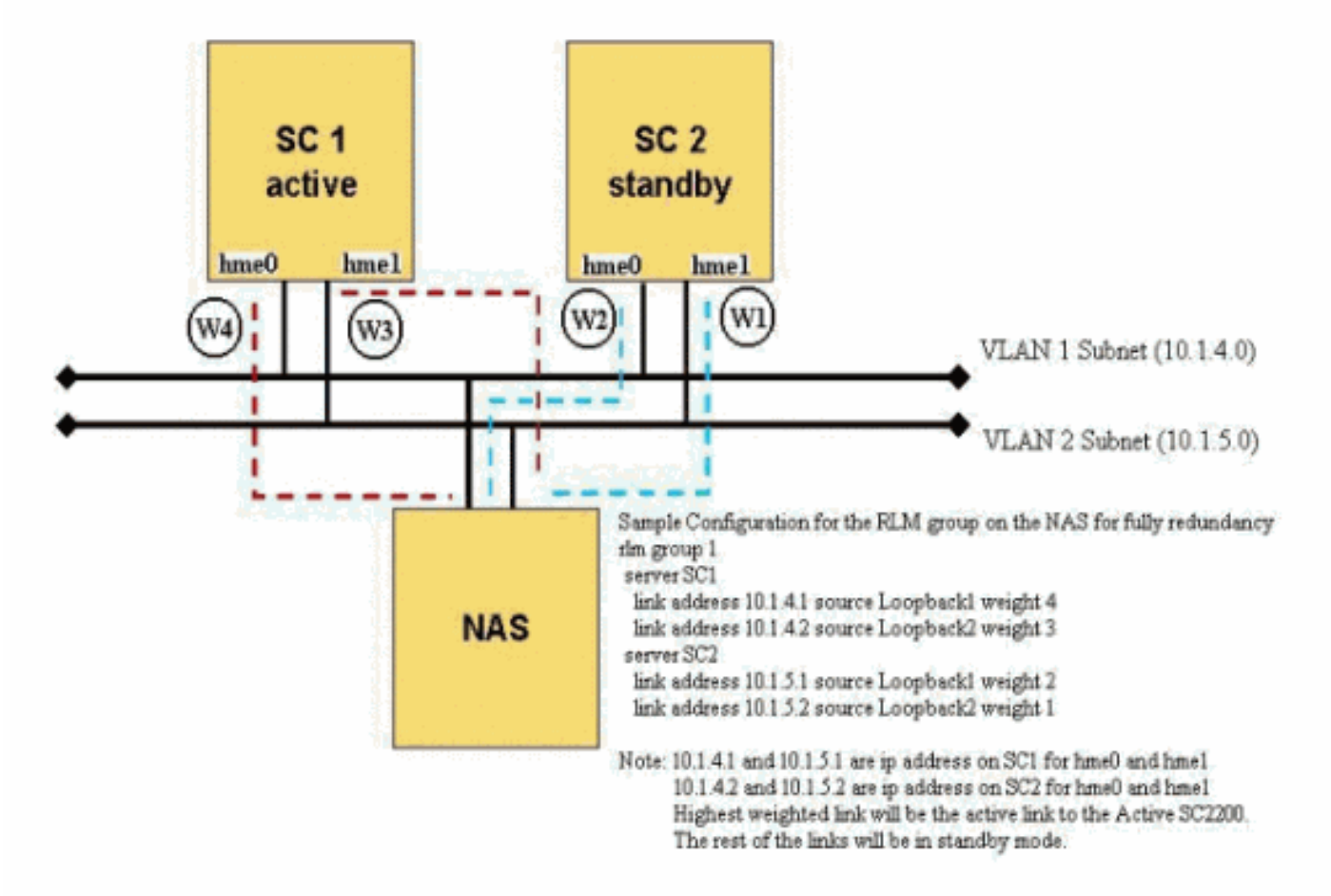
- SS7 Continuity Test (COT)
- **单个信道服务消息**—报告服务状态(是或OOS)单个承载信道的。
- **组服务消息**—报告所有承载信道的服务状态一个或更多T1/E1接口的。
- **同步和再同时**— Checkpoint在PGW2200和NAS网关之间的呼叫状态。这些消息典型地生成，在事件的一交换机确定后任何差异是否在呼叫状态发生。

配置

本部分提供了用于配置本文档所述功能的信息。

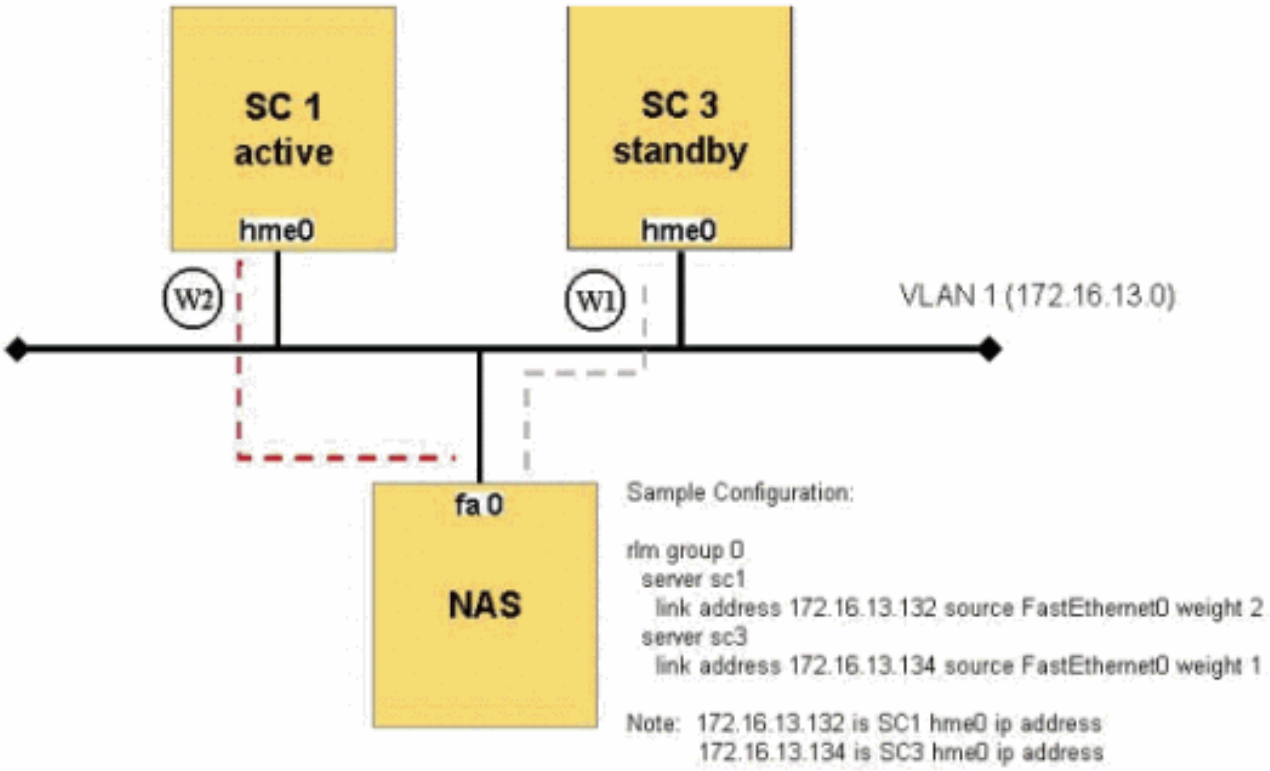
注意： 使用命令查找工具（仅限注册用户）可查找有关本文档所用命令的其他信息。

在NAS网关的配置简单。每个NAS网关有一个或更多RLM组定义。在RLM组内，和，如果PGW2200在冗余模式，有两服务器链路组(一活动PGW2200和另一个的暂挂PGW2200的)。每服务器链路组能有连接对其中每一个PGW2200以太网的一两条链路(E0和E1)接口。NAS网关能使用其接口(环回、以太网或者快速以太网)之一作为源地址创建链路到PGW2200。对于全面冗余，NAS网关连接两个以太网接口对两PGW 2200s。一以太网连接对两PGW2200 hme0在一个VLAN的接口。另一个以太网接口连接对两PGW2200 hme1在另一个VLAN的接口。请参阅此图表关于全面冗余设置。



网络图

本文档使用以下网络设置：



配置

关于关于如何的逐步指导组成RLM组与与PGW2200谈，参考配置SS7互连的媒体网关语音网关解决方案和Redundant Link Manager (RLM)的。

本文不包括关于如何的逐步指导设置SS7互连的PGW2200。参考这些文档欲知更多详细信息：

- Cisco媒介网关控制器版本7文档
- 语音网关解决方案的Cisco SS7互连，版本1.1
- Cisco MGC软件版本7安装&配置指南
- Cisco MGC版本7供应指南

反而，本文集中与NAS设置和验证和故障排除涉及的区域从PGW2200方面。

这是为NAS网关设置的配置示例。注意我们的实验室设置不充分地冗余。NAS网关只有一条信令链路定义对其中每一PGW 2200s。

在NAS的PGW2200
isdn switch-type primary-ni *!--- Define the switch-type to use. !--- For SS7, this must be* ***primary-ni.*** ! controller T1 0 framing esf clock source line primary linecode b8zs **pri-group timeslots 1-24 nfas_d primary nfas_int 0 nfas_group 0** *!--- Configure the NFAS group 0.* ! interface Serial0:23 no ip address encapsulation ppp **isdn switch-type primary-ni** *!--- Define the switch-type to use. !--- For SS7, this must be* ***primary-ni.*** isdn incoming-voice modem **isdn rlm-group 0** *!--- Bind the RLM group 0 to the D-channel. !--- This causes the ISDN signaling to go over IP instead of the TDM D-channel.* no isdn send-status-enquiry *!--- Timeslot24.* isdn negotiate-bchan resend-setup isdn bchan-number-order ascending ! interface FastEthernet0 ip address 172.16.13.141 255.255.255.224 duplex auto speed auto ! **rlm group 0** *!--- Define the RLM group parameters to talk with the PGW 2200.* **server sc1** *!--- Specify the first PGW 2200 and IP addresses used to setup the link.* **link address 172.16.13.132 source FastEthernet0 weight 2 server sc3** *!--- Specify the first PGW 2200 and IP addresses used to setup the link.* LINK ADDRESS 172.16.13.134 SOURCE FASTETHERNET0 WEIGHT 1 !

验证

本部分提供的信息可帮助您确认您的配置是否可正常运行。

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

- **show rlm group** —验证RLM组是正在运行的在NAS网关。
- **show isdn status** —验证ISDN信令在NAS网关适当地运作。
- **show controller t1** —验证所有控制器T1/E1s是正在运行的清洗在NAS网关。
- **show isdn service** —验证所有承载信道在使用中在NAS网关的。
- **rtrv-ne** —验证PGW2200是上和活跃的。
- **rtrv-softw** ：全验证所有软件进程在PGW2200运行。

- **rtrv-sc** ：**全**验证所有信令链路在使用中在PGW2200的。
- **rtrv-dest** ：**全**验证所有目的地链路在使用中在PGW2200的。
- **rtrv-tc** ：**全**验证所有CICs从SS7和NAS网关是上和空闲前景。

检查在NAS网关的这些项目：

- 确保使用**show rlm group命令**， RLM组启用并且运作。
- 使用**show isdn status命令**，适当地确保ISDN信令工作。
- 确保使用**show controller t1命令**， T1/E1s是正在运行的清洗的所有控制器。
- 使用**show isdn service命令**，确保所有承载信道在使用中。

检查在PGW2200的这些项目：

- 确保系统使用**rtrv-ne** mml命令是上和活跃的。
- 使用**rtrv-softw**，确保所有软件进程运行：**所有**mml命令。
- 使用**rtrv-sc**，确保所有信令链路在使用中：**所有**mml命令。
- 使用**rtrv-dest**，确保所有目的地链路在使用中：**所有**mml命令。
- 确保所有CICs是从SS7和NAS网关的上和IDLE前景使用**rtrv-tc** ：**所有**mml命令。

这是从与PGW2200联络没有错误的NAS网关的示例命令输出。

```
NAS1#show rlm group 0 RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 !--- UDP port used to
communicate to the PGW 2200. RLM Version : 2 Link State: Up Last Link Status Reported: Up !---
RLM is up and running. Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]: Last Reported
Priority: HIGH link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[active] !--- Link to
the active PGW 2200. Server Link Group[sc3]: Last Reported Priority: LOW link
[172.16.13.141(FastEthernet0), 172.16.13.134] = socket[standby] !--- Link to the standby PGW
2200. RLM Group 0 Timer Values open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s
minimum-up = 60s retransmit = 1s keepalive = 1s !--- Timer for the echo sent and received. RLM
Group 0 Statistics Link_up: last time occurred at *Jan 14 10:27:23.531, total transition=1
avg=00:00:00.000, max=00:00:00.000, min=00:00:00.000, latest=00:00:00.000 Link_down: last time
occurred at *Jan 14 10:26:47.531, total transition=1 avg=00:00:36.000, max=00:00:36.000,
min=00:00:00.000, latest=00:00:36.000 Link_recovered: last time occurred at none, success=0(0%),
failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Link_switched: last time occurred at
none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Server_changed:
last time occurred at none for totally 0 times Server Link Group[sc1]: Open the link
[172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 10:27:17.531,
success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link
[172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 10:30:51.531,
success=204(99%), failure=1 avg=0.000s, max=0.004s, min=0.000s, latest=0.000s Server Link
Group[sc3]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at
*Jan 14 10:27:17.531, success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s,
latest=3.000s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred
at *Jan 14 10:30:51.531, success=212(99%), failure=1 avg=0.000s, max=0.000s, min=0.000s,
latest=0.000s
```

此列表为RLM计时器提供说明。

- **open_wait = 3s** —等待连接请求是acked。
- **force-down = 30s** —强制RLM的最短时间在故障状态坚持确保远程终端检测链路状态发生故障。
- **= 12s** —时候允许链路恢复到备份链路，在您宣称链路下来前。
- **= 5s** —时候检测链路交换机故障。
- **= 60s** —稳定最近被恢复的更高的首选链路的最短时间在交换前。
- **= 1** — UDP每RLM的重新传输计时器Request信息在请求前是acked。
- **Keepalive = 1** —发送和接收的响应的计时器。

```
NAS1#show isdn stat Global ISDN Switchtype = primary-ni ISDN Serial0:23 interface rlm-group = 0
!--- D-channel bind to rlm-group 0. dsl 0, interface ISDN Switchtype = primary-ni : Primary D-
channel of nfas group 0 Layer 1 Status: ACTIVE Layer 2 Status: TEI = 0, Ces = 1, SAPI = 0, State
```

= MULTIPLE_FRAME_ESTABLISHED *!--- Good.* Layer 3 Status: 0 Active Layer 3 Call(s) Active dsl 0 CCBs = 0 The Free Channel Mask: 0x80FFFFFF Total Allocated ISDN CCBs = 0 NAS1#**show isdn service** PRI Channel Statistics: ISDN Se0:23 SC, Channel [1-24] *!--- Note the keyword PGW 2200. In normal ISDN, it is not there.* Configured Isdn Interface (dsl) 0 Channel State (0=Idle 1=Proposed 2=Busy 3=Reserved 4=Restart 5=Maint_Pend) Channel : 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 State : **0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0** *!--- All timeslots are good and idle including timeslot 24.* Service State (0=Inservice 1=Maint 2=Outofservice) Channel : 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 State : **0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0** NAS1# NAS1#**show controller t1** T1 0 is up. *!--- T1 is up and running clean with no errors.* Applique type is Channelized T1 Cablelength is short 133 No alarms detected. alarm-trigger is not set Version info of slot 0: HW: 4, PLD Rev: 0 Manufacture Cookie Info: EEPROM Type 0x0001, EEPROM Version 0x01, Board ID 0x42, Board Hardware Version 1.32, Item Number 73-2217-05, Board Revision B16, Serial Number 10077744, PLD/ISP Version 0.0, Manufacture Date 25-Sep-1998. **Framing is ESF, Line Code is B8ZS, Clock Source is Line Primary.** *!--- T1 physical layer configuration.* Data in current interval (429 seconds elapsed): 0 Line Code Violations, 0 Path Code Violations 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs Total Data (last 3 15 minute intervals): 0 Line Code Violations, 0 Path Code Violations, 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins, 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs

这是从PGW2200的示例命令输出。它选派项目检查在验证时。

sc1 mml>**rtrv-ne** MGC-01 - Media Gateway Controller 2002-01-14 11:47:24 M RTRV "Type:MGC" "Hardware platform:sun4u sparc SUNW,Ultra-60" "Vendor:"Cisco Systems, Inc."" "Location:MGC-01 - Media Gateway Controller" **"Version:"7.4(11)"** *!--- MGC software version running on PGW 2200.* "Platform State:ACTIVE" *!--- State of the PGW 2200.* ; sc1 mml>**rtrv-softw:all** *!--- Make sure all the processes are active and running.* MGC-01 - Media Gateway Controller 2002-01-14 11:47:29 M RTRV "CFM-01:RUNNING ACTIVE" "ALM-01:RUNNING ACTIVE" "MM-01:RUNNING ACTIVE" "AMDMPR-01:RUNNING ACTIVE" "CDRDMPR-01:RUNNING ACTIVE" "DSKM-01:RUNNING IN N/A STATE" "MMDB-01:RUNNING IN N/A STATE" "POM-01:RUNNING ACTIVE" "MEASAGT:RUNNING ACTIVE" "OPERSAGT:RUNNING ACTIVE" "PROVSAGT:RUNNING ACTIVE" "priip-1:RUNNING IN N/A STATE" "Replic-01:RUNNING ACTIVE" "ENG-01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>**rtrv-sc:all** MGC-01 - Media Gateway Controller 2002-01-14 11:47:36 M RTRV "gw1link1:signas1,LID=0:IS" *!--- IP signaling link from the NAS to PGW 2200 (rlm group) !--- LID=0:IS means the RLM is up.* null **"ls1-link1:ls1,LID=0:IS"** *!--- IP signaling link from the SLT to the PGW 2200 (C7IPLINK).* null ; sc1 mml>**rtrv-dest:all** MGC-01 - Media Gateway Controller 2002-01-14 11:47:39 M RTRV "dpc-sc2200:PKG=SS7-ANSI,ASSOC=signas1,PST=IS,SST=RSTO" *!--- SS7 signal to the destination point code (DPC).* **"signas1:PKG=ISDNPRI,ASSOC=dpc-sc2200,PST=IS,SST=RSTO"** *!--- ISDN signaling between the NAS and the PGW 2200 !--- (same as **show isdn status** on NAS).* ; sc1 mml>**rtrv-tc:all** Retrieving results. This could take a few moments... MGC-01 - Media Gateway Controller 2002-01-14 11:47:46 M RTRV **"dpc-sc2200:CIC=1,PST=IS,CALL=IDLE,BLK=NONE"** *!--- InterMachine Trunk (IMT) status on SS7 side toward the DPC switch.* "dpc-sc2200:CIC=2,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=3,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=4,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=5,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=6,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=7,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=8,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=9,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=10,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=11,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=12,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=13,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=14,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=15,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=16,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=17,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=18,PST=IS,CALL=IDLE,BLK=NONE" <Press Enter to continue OR Press * and Enter to quit output of command> "dpc-sc2200:CIC=19,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=20,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=21,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=22,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=23,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=24,PST=IS,CALL=IDLE,BLK=NONE" "signas1:TC=1,CALL=IDLE,PST=IS,SPAN=0" *!--- Corresponding T1 timeslots on the NAS gateway side to the SC !--- (same as **show isdn service** on NAS) **CALL=** specify the direction of the call !--- **SPAN=0** specify the nfas_int.* "signas1:TC=2,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=3,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=4,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=5,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=6,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=7,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=8,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=9,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=10,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=11,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=12,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=13,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=14,CALL=IDLE,PST=IS,SPAN=0" <Press Enter to

```
continue OR Press * and Enter to quit output of command> "signas1:TC=15,CALL=IDLE,PST=IS,SPAN=0"
"signas1:TC=16,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=17,CALL=IDLE,PST=IS,SPAN=0"
"signas1:TC=18,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=19,CALL=IDLE,PST=IS,SPAN=0"
"signas1:TC=20,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=21,CALL=IDLE,PST=IS,SPAN=0"
"signas1:TC=22,CALL=IDLE,PST=IS,SPAN=0" "signas1:TC=23,CALL=IDLE,PST=IS,SPAN=0"
"signas1:TC=24,CALL=IDLE,PST=IS,SPAN=0" sc1 mml>prov-rtrv:all !--- Retrieved the current
configuration on the PGW 2200. MGC-01 - Media Gateway Controller 2002-01-15 09:25:12 M RTRV
"session=active:all"  ; sc1 mml>prov-rtrv:NASPATH:name="signas1" MGC-01 - Media Gateway
Controller 2002-01-15 09:25:27 M RTRV "SESSION=ACTIVE:NASPATH"  ; !--- In PGW release 9.3(2) and
later, the BELL_1268_C3 variant !--- is changed to BELL_1268_C2. prov-
add:NASPATH:NAME="signas1",DESC="Signaling Service to V5300-1",EXTNODE="v5300-
1",MDO="BELL_1268_C2",CUSTGRPID="0000" sc1 mml>prov-rtrv:IPLNK:name="gw1link1" !--- Get detail
information on the IP link to the PGW 2200. MGC-01 - Media Gateway Controller 2002-01-15
09:25:49 M RTRV "SESSION=ACTIVE:IPLNK"  ; sc1 mml>
```

您能也验证在/opt/CiscoMGC/etc目录查找的.dat文件的此同样信息。.dat文件是从配置和设置PGW2200收集的信息。sigChanDevIp.dat文件包含关于IP链路的所有信息对从NAS网关和SLT的PGW2200。

```
sc1% more sigChanDevIp.dat00100001  IP_Addr1  3001  172.16.13.141  3001
  0.0.0.0  255.255.255.255001d0001  IP_Addr1  7000  172.16.13.139  32767
  0.0.0.0  255.255.255.255
sc1%
```

请使用此信息确保，在sigChanDevIp.dat配置的IP地址正确。

```
00100001  IP_Addr1  3001  172.16.13.141  3001  0.0.0.0  255.255.255.255
00100001 = Signalling Channel Component ID as defined for the engine.
!--- Must match what is configured in the components.dat file. IP_Addr1 = Symbolic link to the
name defined within XECfgParm.dat !--- *.IP_Addr1 = 172.16.13.132 # Address of interface on
motherboard. 3001 = UDP port defined for receive side of ISDN messages. !--- RLM manager runs on
the - 1 value, or 3000 in this example. 172.16.13.141 = IP address of the NAS gateway. !--- Must
match the IP address defined in the RLM group on the NAS gateway. 3001 = UDP port defined for
transmit side of ISDN messages for the NAS gateway !--- RLM manager runs on the - 1 value, or
3000 in this example.
```

确保正确ISDN协议在ISDN/IP连接配置运行。

获得在sigChanDevIp.dat文件内的PGW2200组件ID (00100001)信息IP链路的。然后，请去sigChanDev.dat文件并且获得信号路径组件ID的(00140001)组件ID在第四列。使用此信号路径组件ID，请使用sigPath.dat文件查找ISDN协议使用(ISDNPRI BELL_1268_C3)。

注意： 在PGW版本9.3(2)中及以后， BELL_1268_C3变量更改对BELL_1268_C2。

这是从PGW2200的输出。

```
sc1% more sigChanDevIp.dat 00100001 IP_Addr1 3001 172.16.13.141 3001 0.0.0.0 255.255.255.255
001d0001 IP_Addr1 7000 172.16.13.139 32767 0.0.0.0 255.255.255.255 sc1% grep 00100001 *
components.dat:00100001 00140001 "gw1link1" "Link1 between gw1 and the sc2200-1"
sigChanDev.dat:00100001 00160001 1 00140001 0003000c 00060001 0 sigChanDevIp.dat:00100001
IP_Addr1 3001 172.16.13.141 3001 0.0.0.0 255.255.255.255 sc1% sc1% grep 00140001 *
bearChan.dat:101 00130002 ffff 1 00140001 0 1 bearChan.dat:102 00130002 ffff 2 00140001 0 2
bearChan.dat:103 00130002 ffff 3 00140001 0 3 bearChan.dat:104 00130002 ffff 4 00140001 0 4
bearChan.dat:105 00130002 ffff 5 00140001 0 5 bearChan.dat:106 00130002 ffff 6 00140001 0 6
bearChan.dat:107 00130002 ffff 7 00140001 0 7 bearChan.dat:108 00130002 ffff 8 00140001 0 8
bearChan.dat:109 00130002 ffff 9 00140001 0 9 bearChan.dat:110 00130002 ffff a 00140001 0 a
bearChan.dat:111 00130002 ffff b 00140001 0 b bearChan.dat:112 00130002 ffff c 00140001 0 c
bearChan.dat:113 00130002 ffff d 00140001 0 d bearChan.dat:114 00130002 ffff e 00140001 0 e
bearChan.dat:115 00130002 ffff f 00140001 0 f bearChan.dat:116 00130002 ffff 10 00140001 0 10
bearChan.dat:117 00130002 ffff 11 00140001 0 11 bearChan.dat:118 00130002 ffff 12 00140001 0 12
bearChan.dat:119 00130002 ffff 13 00140001 0 13 bearChan.dat:120 00130002 ffff 14 00140001 0 14
bearChan.dat:121 00130002 ffff 15 00140001 0 15 bearChan.dat:122 00130002 ffff 16 00140001 0 16
bearChan.dat:123 00130002 ffff 17 00140001 0 17 bearChan.dat:124 00130002 ffff 18 00140001 0 18
```

```
components.dat:00100001 00140001 "gw1link1" "Link1 between gw1 and the sc2200-1"
components.dat:00140001 00160001 "signas1" "Signaling service to gw1" sigChanDev.dat:00100001
00160001 1 00140001 0003000c 00060001 0 sigPath.dat:00140001 ISDNPRI BELL_1268_C3 0000 0101 22
network n 0 0 0 2 0000 N sc1%
```

注意：

- **00140001** —信号路径组件ID。
- **ISDNPRI** —为了ISDN的值在工作的IP。
- **BELL_1268_C3 0** —指定主要的NI2协议类型(必须是ISDN的此值在IP)。

注意： 在PGW版本9.3(2)中及以后， BELL_1268_C3变量更改对BELL_1268_C2。

参考配置数据文件参考关于组件和.dat文件的更多信息。

这是暂挂PGW2200的一些参考信息。大多数此信息在服务范围外的(OOS)备用模式。

```
sc3 mml>rtrv-ne MGC-02 - Media Gateway Controller 2002-01-15 17:42:50 M RTRV "Type:MGC"
"Hardware platform:sun4u sparc SUNW,Ultra-60" "Vendor:"Cisco Systems, Inc."" "Location:MGC-02 -
Media Gateway Controller" "Version:"7.4(11)"" "Platform State:STANDBY" !--- The current state of
the PGW 2200. ; sc3 mml>rtrv-softw:all !--- Note the processes are running in STANDBY mode. MGC-
02 - Media Gateway Controller 2002-01-15 17:42:54 M RTRV "CFM-01:RUNNING STANDBY" "ALM-
01:RUNNING STANDBY" "MM-01:RUNNING STANDBY" "AMDMPR-01:RUNNING STANDBY" "CDRDMPR-01:RUNNING
STANDBY" "DSKM-01:RUNNING IN N/A STATE" "MMDB-01:RUNNING IN N/A STATE" "POM-01:RUNNING STANDBY"
"MEASAGT:RUNNING STANDBY" "OPERSAGT:RUNNING STANDBY" "PROVSAGT:RUNNING STANDBY" "priip-1:RUNNING
IN N/A STATE" "Replic-01:RUNNING STANDBY" "ENG-01:RUNNING STANDBY" "IOCM-01:RUNNING STANDBY"
"TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING IN N/A STATE" "FOD-01:RUNNING IN N/A STATE"
<Press Enter to continue OR Press * and Enter to quit output of command> "LOG-01:RUNNING IN N/A
STATE" ; sc3 mml> rtrv-sc:all MGC-02 - Media Gateway Controller 2002-01-15 17:43:00 M RTRV
"GW1LINK1:SIGNAS1,LID=0:OOS,STBY"  "ls1-link1:ls1,LID=0:OOS,STBY"  ; sc3 mml> rtrv-dest:all MGC-
02 - Media Gateway Controller 2002-01-15 17:43:04 M RTRV "dpc-sc2200:PKG=SS7-
ANSI,ASSOC=signas1,PST=IS,SST=RSTO" "SIGNAS1:PKG=ISDNPRI,ASSOC=DPC-SC2200,PST=IS,SST=RSTO" ;
```

故障排除

本部分提供的信息可用于对配置进行故障排除。

故障排除命令

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

注意： 发出 **debug** 命令之前，请参阅有关 Debug 命令的重要信息。

- **debug rlm group x** —显示关于Keepalive的在PGW2200和NAS网关之间的信息和数据包流。
- **show access-list 199** —在PGW2200和NAS之间的流量用于过滤。
- **debug ip packet 199 detail** —显示详细IP调试信息。
- **debug isdn q921** —显示发生在ISDN接口的D-channel的路由器的数据链路层2接入过程。
- **show debug** —显示调试信息。
- **show isdn status** —显示所有ISDN接口状况。
- **show rlm group 0** —显示RLM的状态。

当您排除故障NAS和PGW2200之间时的通信，有两主要部分：

- RLM信令
- ISDN信令

能造成RLM在故障状态的几问题是：

- 在路由器或PGW2200的配置错误。
- 实际上，接口(以太网、快速以太网，序列x:23)被关闭或有电缆。
- 阻塞两个设备IP地址之间的通信， UDP端口3000的访问列表(RLM-mgr)，和3001 (ISDN)。

在NAS网关上，请运行**debug rlm group x命令**查看Keepalive和数据包流在PGW2200和NAS网关之间。

此输出显示从NAS网关的若干示例命令输出。在正常操作，有不变Keepalive (ECHO_REQ和ECHO_ACK)交换在NAS网关和PGW2200之间每1秒。如果这不发生，请推测谁是不响应或发送Keepalive。

注意： TID (交易ID)是同一ECHO请求和响应确认。即使另一PGW2200 (172.16.13.134)在备用模式，与NAS网关经常联络。

```
NAS1#debug rlm group 0 RLM Group debugging is on NAS1#terminal monitor NAS1# *Jan 14
14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=15304)
*Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx
ECHO_REQ(tid=15734) *Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] rx ECHO_ACK(tid=15304) *Jan 14 14:50:53.270: rlm 0: link
[172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=15734) *Jan 14 14:50:54.270: rlm
0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=15305) *Jan 14
14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=15735)
*Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx
ECHO_ACK(tid=15305) *Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=15735)
```

当您发出**no shut命令**给RLM组时，这是RLM组的启动和ISDN信令。

```
NAS1#show access-list 199 !--- Access-list used to filter on traffic between !--- the PGW 2200
and the NAS. Extended IP access list 199 permit ip host 172.16.13.132 host 172.16.13.141 permit
ip host 172.16.13.141 host 172.16.13.132 NAS1#debug ip packet 199 det IP packet debugging is on
(detailed) for access list 199 NAS1#debug rlm group 0 RLM Group debugging is on NAS1#debug isdn
q921 ISDN Q921 packets debugging is on NAS1#debug rlm group 0 event RLM Group Event debugging is
on NAS1#debug rlm group 0 packet RLM Group Packet debugging is on NAS1#show debug Generic IP: IP
packet debugging is on (detailed) for access list 199 RLM_GROUP: RLM Group debugging is on RLM
Group Event debugging is on RLM Group Packet debugging is on ISDN: ISDN Q921 packets debugging
is on ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-) DSL 0 --> 7 1 - - - - - - - NAS1#
NAS1#configure term Enter configuration commands, one per line. End with CNTL/Z.
NAS1(config)#rlm group NAS1(config)#rlm group 0 NAS1(config-rlm-group)#no shut NAS1(config-rlm-
group)#end NAS1# !--- Receive event to enable RLM and wait for the force-down timer !--- to
expire before it starts to send the keepalives to !--- establish the link to the PGW 2200. *Jan
14 18:04:21.734: rlm 0: [State_Shutdown, rx ENABLE] *Jan 14 18:04:22.222: %SYS-5-CONFIG_I:
Configured from console by vty0 (171.69.85.65) NAS1#show rlm group 0 RLM Group 0 Status
User/Port: RLM_MGR/3000 ISDN/3001 RLM Version : 2 Link State: Down Last Link Status Reported:
Down !--- Current state of the RLM group. Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]:
Last Reported Priority: HIGH link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[closed]
!--- Communication socket is closed. Server Link Group[sc3]: Last Reported Priority: LOW link
[172.16.13.141(FastEthernet0), 172.16.13.134] = socket[closed] RLM Group 0 Timer Values
open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s
keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan 14 17:59:49.870, total
transition=4 avg=01:49:34.264, max=05:40:16.976, min=00:00:00.000, latest=00:02:08.728
Link_down: last time occurred at *Jan 14 18:01:58.598, total transition=3 avg=00:08:27.002,
max=00:16:18.004, min=00:00:00.000, latest=00:16:18.004 Link_recovered: last time occurred at
*Jan 14 12:03:14.887, success=2(100%), failure=0 avg=0.004s, max=0.004s, min=0.000s,
latest=0.004s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s,
max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at *Jan 14 12:03:14.891
for totally 2 times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0),
172.16.13.132]: last time occurred at *Jan 14 17:59:46.870, success=2(100%), failure=0
avg=1.502s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0),
172.16.13.132]: last time occurred at *Jan 14 18:01:57.874, success=25581(99%), failure=35
avg=0.000s, max=0.032s, min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link
[172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 17:59:46.870,
```

success=2(100%), failure=0 avg=1.502s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 18:01:57.874, success=26182(99%), failure=40 avg=0.000s, max=0.032s, min=0.000s, latest=0.000s NAS1#**show isdn status** *!--- ISDN status is always DOWN if RLM is not up and running.* Global ISDN Switchtype = primary-ni ISDN Serial0:23 interface rlm-group = 0 dsl 0, interface ISDN Switchtype = primary-ni : Primary D-channel of nfas group 0 Layer 1 Status: **DEACTIVATED** Layer 2 Status: TEI = 0, Ces = 1, SAPI = 0, State = **TEI_ASSIGNED** Layer 3 Status: 0 Active Layer 3 Call(s) Active dsl 0 CCBs = 0 The Free Channel Mask: 0xFFFFFF Total Allocated ISDN CCBs = 0 NAS1# *!--- Force-down timer expired and router starts to send out !--- the ECHO_REQ to the PGW 2200 to establish the link.* *Jan 14 18:04:51.734: rlm 0: [State_Down, **rx DOWN_MIN_TIMEOUT]** *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[172.16.13.141, 172.16.13.132] *!--- Open the RLM user socket for both the RLM !--- manager and ISDN signaling. !--- Router sends out ECHO_REQ (RLM keepalive) to !--- the PGW 2200 to start the communication.* *Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132] for user RLM_MGR *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **is opened** *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **tx ECHO_REQ(tid=25616)** *Jan 14 18:04:51.734: **IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending** *Jan 14 18:04:51.734: **UDP src=3000, dst=3000** *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[172.16.13.141, 172.16.13.132] *Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132] **for user ISDN** *!--- Same process for the standby PGW 2200.* *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[172.16.13.141, 172.16.13.134] *Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134] for user RLM_MGR *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] is opened *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] **tx ECHO_REQ(tid=26222)** *Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[172.16.13.141, 172.16.13.134] *Jan 14 18:04:51.738: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134] for user ISDN *Jan 14 18:04:51.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:51.738: UDP src=3000, dst=3000 *!--- Recevied the ECHO_ACK back from the active and !--- standby PGW 2200.* *Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx **ECHO_ACK(tid=25616)** *Jan 14 18:04:51.738: rlm 0: [State_Down, rx LINK_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132] *Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx **ECHO_ACK(tid=26222)** *Jan 14 18:04:51.738: rlm 0: [State_Down, rx LINK_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134] *!--- Router continues to send out ECHO_REQ and !--- receive ECHO_ACK several times. !--- This is needed to make sure the communication !--- between the NAS gateway and PGW 2200 is good.* *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=25617) *Jan 14 18:04:52.738: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:52.738: UDP src=3000, dst=3000 *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26223) *Jan 14 18:04:52.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:52.738: UDP src=3000, dst=3000 *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25617) *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26223) *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=25618) *Jan 14 18:04:53.738: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:53.738: UDP src=3000, dst=3000 *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26224) *Jan 14 18:04:53.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:53.738: UDP src=3000, dst=3000 *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25618) *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26224) *!--- After three keepalives are transmitted and three replies !--- are received back (approximately the open_wait timer), the router !--- starts the link activation. !--- Note that all of the links have a preferred weight !--- association. NAS chooses the link with the highest preference !--- among those successful links. NAS waits for !--- a certain amount of time specified by open_wait timer !--- (three seconds) to allow the highest preference connections to reach !--- the PGW 2200 before it selects the signaling link. !--- Once the highest preference link is established, !--- NAS chooses it as the active signaling link immediately and does not wait !--- for the rest of the connections. Once the active signaling link is decided, !--- NAS sends out the datagram RLM message START_REQ over the chosen !--- link to the PGW 2200. When PGW 2200 receives this*

message, !--- SAS responds with a START_ACK message and then declares the !--- link to be up as well. At this point, the PGW 2200 can start !--- to transmit packets. When NAS receives START_ACK back, NAS !--- declares the link to be up or active and leaves the rest of the links alone. !--- For managing UDP links, UDP sockets opened under an active !--- link are assigned to those registered RLM users for !--- transmitting and receiving packets. The status RLM_LINK_UP !--- is reported to RLM users after the signaling link is !--- established and synchronized. At this point, NAS can start !--- to transmit packets. Due to the unreliable transport under UDP, !--- these START_REQ and START_ACK packets can get lost. RLM uses !--- the timer retransmission timer to wait for the START_ACK. !--- If the timer expires and the link is still not closed or down, the packet !--- is resent under UDP. *Jan 14 18:04:54.734: rlm 0: [State_Down, rx OPEN_WAIT_TIMEOUT] *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **tx START_REQ(tid=0)** *Jan 14 18:04:54.734: **IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending** *Jan 14 18:04:54.734: **UDP src=3000, dst=3000** *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **requests activation** *Jan 14 18:04:54.734: **IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3** *Jan 14 18:04:54.734: **UDP src=3000, dst=3000** *!--- RLM manager UDP port.* *Jan 14 18:04:54.734: **IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 31, rcvd 3** *Jan 14 18:04:54.734: **UDP src=3001, dst=3001** *!--- ISDN signaling UDP port.* *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **rx START_ACK(tid=0)** *Jan 14 18:04:54.734: rlm 0: [State_Down, rx START_ACK] over link [172.16.13.141(FastEthernet0), 172.16.13.132] *Jan 14 18:04:54.734: **%ISDN-4-RLM_STATUS_CHANGE: ISDN SC Se0:23 SC: Status Changed to: Link Up.** *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **is activated** *!--- The router starts to establish the ISDN signaling !--- with the PGW 2200. Note, the NAS gateway sends the !--- signaling packet across the FastEthernet interface using UDP !--- port 3001. Once both sides have received the !--- Unnumbered Acknowledge (UA) frame from each other, ISDN Layer 2 status !--- moves from the TEI_ASSIGNED state to the MULTIPLE_FRAME_ESTABLISHED state. !--- Next, normal ISDN keepalives (RRf and RRp) are being exchanged between !--- the PGW 2200 and the NAS gateway.* *Jan 14 18:04:54.738: ISDN Se0:23 SC: **RX <- SABMEp** c/r = 1 sapi = 0 tei = 0 *Jan 14 18:04:54.738: %ISDN-6-LAYER2UP: Layer 2 for Interface Se0:23 SC, TEI 0 changed to up *Jan 14 18:04:54.738: ISDN Se0:23 SC: **TX -> SABMEp** c/r = 0 sapi = 0 tei = 0 *Jan 14 18:04:54.738: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 31, sending *Jan 14 18:04:54.738: UDP src=3001, dst=3001 *Jan 14 18:04:54.742: **ISDN Se0:23 SC: TX -> UAf** c/r = 1 sapi = 0 tei = 0 *Jan 14 18:04:54.742: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 31, sending *Jan 14 18:04:54.742: UDP src=3001, dst=3001 *Jan 14 18:04:54.742: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 0 nr = 0 i = 0x430200000A6808C000000000000000 *Jan 14 18:04:54.742: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 47, sending *Jan 14 18:04:54.742: UDP src=3001, dst=3001 *Jan 14 18:04:54.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26225) *Jan 14 18:04:54.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 31, rcvd 3 *Jan 14 18:04:54.742: UDP src=3001, dst=3001 *Jan 14 18:04:54.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 32, rcvd 3 *Jan 14 18:04:54.746: UDP src=3001, dst=3001 *Jan 14 18:04:54.746: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 1 nr = 0 i = 0x430200000A6808C000000000000000 *Jan 14 18:04:54.746: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 47, sending *Jan 14 18:04:54.746: UDP src=3001, dst=3001 *Jan 14 18:04:54.746: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26225) *Jan 14 18:04:54.746: **ISDN Se0:23 SC: RX <- UAf** c/r = 0 sapi = 0 tei = 0 *Jan 14 18:04:54.746: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 1 *Jan 14 18:04:54.750: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 32, rcvd 3 *Jan 14 18:04:54.750: UDP src=3001, dst=3001 *Jan 14 18:04:54.750: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 2 *Jan 14 18:04:54.754: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 41, rcvd 3 *Jan 14 18:04:54.754: UDP src=3001, dst=3001 *Jan 14 18:04:54.758: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 0 nr = 2 i = 0x430280005A080283A9 *Jan 14 18:04:54.758: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 1 *Jan 14 18:04:54.758: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 32, sending *Jan 14 18:04:54.758: UDP src=3001, dst=3001 *Jan 14 18:04:54.766: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 41, rcvd 3 *Jan 14 18:04:54.766: UDP src=3001, dst=3001 *Jan 14 18:04:54.766: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 1 nr = 2 i = 0x430280005A080283A9 *Jan 14 18:04:54.766: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 2 *Jan 14 18:04:54.766: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 32, sending *Jan 14 18:04:54.770: UDP src=3001, dst=3001 *Jan 14 18:04:55.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26226) *Jan 14 18:04:55.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26226) *Jan 14 18:04:56.734: %LINK-3-UPDOWN: Interface Serial0:23, changed state to up *Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0),

172.16.13.132] tx ECHO_REQ(tid=25619) *Jan 14 18:04:56.742: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:56.742: UDP src=3000, dst=3000 *Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26227) *Jan 14 18:04:56.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:56.742: UDP src=3000, dst=3000 *Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25619) *Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26227) *Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=25620) *Jan 14 18:04:57.742: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:57.742: UDP src=3000, dst=3000 *Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26228) *Jan 14 18:04:57.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:57.742: UDP src=3000, dst=3000 *Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25620) *Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26228) *Jan 14 18:04:57.866: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 47, rcvd 3 *Jan 14 18:04:57.866: UDP src=3001, dst=3001 *Jan 14 18:04:57.866: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 2 nr = 2 i = 0x430200000A6808C000000000000000 *Jan 14 18:04:57.866: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 3 *Jan 14 18:04:57.870: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 32, sending *Jan 14 18:04:57.870: UDP src=3001, dst=3001 *Jan 14 18:04:57.870: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 2 nr = 3 i = 0x430280000A6808C000000000000000 *Jan 14 18:04:57.870: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 47, sending *Jan 14 18:04:57.870: UDP src=3001, dst=3001 *Jan 14 18:04:57.870: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 3 nr = 3 i = 0x4302000006660500FFFFFF00 *Jan 14 18:04:57.874: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 44, sending *Jan 14 18:04:57.874: UDP src=3001, dst=3001 *Jan 14 18:04:57.874: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 32, rcvd 3 *Jan 14 18:04:57.874: UDP src=3001, dst=3001 *Jan 14 18:04:57.874: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 3 *Jan 14 18:04:57.874: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 32, rcvd 3 *Jan 14 18:04:57.874: UDP src=3001, dst=3001 *Jan 14 18:04:57.874: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 4 *Jan 14 18:04:57.886: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 44, rcvd 3 *Jan 14 18:04:57.886: UDP src=3001, dst=3001 *Jan 14 18:04:57.886: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 3 nr = 4 i = 0x430280000B660500FFFFFF00 *Jan 14 18:04:57.886: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 4 *Jan 14 18:04:57.886: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 32, sending *Jan 14 18:04:57.890: UDP src=3001, dst=3001 *Jan 14 18:04:58.386: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 44, rcvd 3 *Jan 14 18:04:58.386: UDP src=3001, dst=3001 *Jan 14 18:04:58.386: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 4 nr = 4 i = 0x43020000086705000000000 *Jan 14 18:04:58.386: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 5 *Jan 14 18:04:58.390: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 32, sending *Jan 14 18:04:58.390: UDP src=3001, dst=3001 *Jan 14 18:04:58.390: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 4 nr = 5 i = 0x43028000096705000000000 *Jan 14 18:04:58.390: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 44, sending *Jan 14 18:04:58.390: UDP src=3001, dst=3001 *Jan 14 18:04:58.394: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 32, rcvd 3 *Jan 14 18:04:58.394: UDP src=3001, dst=3001 NAS1#**undebug all** All possible debugging has been turned off NAS1# NAS1#**show rlm group 0** RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM Version : 2 Link State: Up Last Link Status Reported: Up Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]: Last Reported Priority: HIGH link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[active] Server Link Group[sc3]: Last Reported Priority: LOW link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[standby] RLM Group 0 Timer Values open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan 14 18:04:54.734, total transition=5 avg=01:49:34.264, max=05:40:16.976, min=00:00:00.000, latest=00:02:08.728 Link_down: last time occurred at *Jan 14 18:01:58.598, total transition=3 avg=00:06:36.713, max=00:16:18.004, min=00:00:00.000, latest=00:02:56.136 Link_recovered: last time occurred at *Jan 14 12:03:14.887, success=2(100%), failure=0 avg=0.004s, max=0.004s, min=0.000s, latest=0.004s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at *Jan 14 12:03:14.891 for totally 2 times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 18:04:51.734, success=3(100%), failure=0 avg=1.002s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 18:05:02.742, success=25590(99%), failure=35 avg=0.000s, max=0.032s,

min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 18:04:51.734, success=3(100%), failure=0 avg=1.002s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 18:05:02.742, success=26194(99%), failure=40 avg=0.000s, max=0.032s, min=0.000s, latest=0.000s all All possible debugging has been turned off NAS1# NAS1#**show isdn stat** Global ISDN Switchtype = primary-ni ISDN Serial0:23 interface rlm-group = 0 dsl 0, interface **ISDN Switchtype = primary-ni : Primary D channel of nfas group 0** Layer 1 Status: ACTIVE Layer 2 Status: TEI = 0, Ces = 1, SAPI = 0, State = **MULTIPLE_FRAME_ESTABLISHED** Layer 3 Status: 0 Active Layer 3 Call(s) Active dsl 0 CCBs = 0 The Free Channel Mask: 0x80FFFFFF Total Allocated ISDN CCBs = 0 NAS1#

这是一个切换的debug输出示例从活动PGW2200到一暂挂PGW2200。

NAS1#**show rlm group 0** RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM Version : 2 **Link State: Up Last Link Status Reported: Up** Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]: Last Reported Priority: **HIGH** link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[**active**] Server Link Group[sc3]: Last Reported Priority: LOW link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[**standby**] RLM Group 0 Timer Values open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan 15 17:26:51.635, total transition=1 avg=00:00:00.000, max=00:00:00.000, min=00:00:00.000, latest=00:00:00.000 Link_down: last time occurred at *Jan 15 17:26:15.635, total transition=1 avg=00:00:36.000, max=00:00:36.000, min=00:00:00.000, latest=00:00:36.000 Link_recovered: last time occurred at none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at none for totally 0 times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 15 17:26:45.635, success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 15 18:35:57.371, success=4009(99%), failure=1 avg=0.000s, max=0.068s, min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 15 17:26:45.635, success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 15 18:35:57.371, success=4149(99%), failure=1 avg=0.000s, max=0.068s, min=0.000s, latest=0.000s NAS1#**show debug** NAS1# NAS1#**show access-list 199** Extended IP access list 199 permit ip host 172.16.13.132 host 172.16.13.141 permit ip host 172.16.13.141 host 172.16.13.132 NAS1#**debug rlm group 0 event** RLM Group Event debugging is on NAS1#**debug rlm group 0 packet** RLM Group Packet debugging is on NAS1#**debug rlm group 0** RLM Group debugging is on NAS1#**debug isdn q921** ISDN Q921 packets debugging is on NAS1#**debug ip packet 199 detail** IP packet debugging is on (detailed) for access list 199 NAS1#**terminal monitor** NAS1# *!--- Note the keepalives are exchanged normally.* *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4090) *Jan 15 18:37:20.507: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:20.507: UDP src=3000, dst=3000 *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4232) *Jan 15 18:37:20.507: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 15 18:37:20.507: UDP src=3000, dst=3000 *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=4090) *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4232) *Jan 15 18:37:21.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4091) *Jan 15 18:37:21.507: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:21.507: UDP src=3000, dst=3000 *Jan 15 18:37:21.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4233) *Jan 15 18:37:21.511: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4233) *!--- **Note:** The NAS gateway receives !--- an ECHO_REQ from the PGW 2200 !--- when the switch-over occurs. Within the packet, there is a change in the !--- priority setting and the NAS gateway is informed to re-establish the link to !--- the new active PGW 2200 (172.16.13.134).* *Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_REQ(tid=1) *Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_ACK(tid=1) *Jan 15 18:37:21.763: rlm 0 server : **sc3 changing priority from LOW to HIGH** *Jan 15 18:37:21.763: rlm 0: [State_Up, rx NEW_LINK_WEIGHTING] over link [172.16.13.141(FastEthernet0), 172.16.13.134] *Jan 15 18:37:21.763: rlm 0 **Link ordering : New Server sc3** *Jan 15 18:37:21.763: rlm 0 **Link ordering : Current Server sc1** *!--- The NAS gateway starts the link activation !--- toward the new active PGW 2200 and becomes active. The other !--- link is deactivated and goes into standby.* *Jan 15

18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] tx START_REQ**(tid=1) *Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] **requests activation** *Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] rx START_ACK**(tid=1) *Jan 15 18:37:21.767: rlm 0: [State_Recover, rx START_ACK] over link [172.16.13.141(FastEthernet0), 172.16.13.134] *Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.132] is deactivated *Jan 15 18:37:21.767: %ISDN-4-RLM_STATUS_CHANGE: ISDN SC Se0:23 SC: Status Changed to: Server Switched.** *Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] is activated** *Jan 15 18:37:21.767: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 4 nr = 4 i = 0x430200000A6808C000000000000000 *!--- The NAS gateway needs to re-establish the ISDN !--- signaling with the new active PGW 2200.* *Jan 15 18:37:21.771: **ISDN Se0:23 SC: RX <- SABMEp** c/r = 1 sapi = 0 tei = 0 *Jan 15 18:37:22.519: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4092) *Jan 15 18:37:22.519: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:22.519: UDP src=3000, dst=3000 *Jan 15 18:37:22.523: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 64, rcvd 3 *Jan 15 18:37:22.523: ICMP type=3, code=3 *Jan 15 18:37:22.863: **ISDN Se0:23 SC: RX <- SABMEp** c/r = 1 sapi = 0 tei = 0 *Jan 15 18:37:22.863: **ISDN Se0:23 SC: TX -> UAf** c/r = 1 sapi = 0 tei = 0 *Jan 15 18:37:23.523: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4093) *Jan 15 18:37:23.523: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:23.523: UDP src=3000, dst=3000 *Jan 15 18:37:24.527: rlm 0: [State_Up, rx LINK_BROKEN] over link [172.16.13.141(FastEthernet0), 172.16.13.132] *Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4094) *Jan 15 18:37:24.527: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:24.527: UDP src=3000, dst=3000 *Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4234) *Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4234) *Jan 15 18:37:25.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4235) *Jan 15 18:37:25.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4235) *Jan 15 18:37:26.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4236) *Jan 15 18:37:26.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4236) *Jan 15 18:37:27.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4095) *Jan 15 18:37:27.527: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:27.527: UDP src=3000, dst=3000 *Jan 15 18:37:27.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4237) *Jan 15 18:37:27.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4237) *Jan 15 18:37:28.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4238) *Jan 15 18:37:28.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4238) *Jan 15 18:37:29.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4239) *Jan 15 18:37:29.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4239) *Jan 15 18:37:30.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4096) *Jan 15 18:37:30.527: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:30.527: UDP src=3000, dst=3000 *Jan 15 18:37:30.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4240) *Jan 15 18:37:30.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4240) *Jan 15 18:37:31.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4241) *Jan 15 18:37:31.531: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4241) *Jan 15 18:37:31.767: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 0 nr = 0 i = 0x430200000A6808C000000000000000 *Jan 15 18:37:31.767: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 1 *Jan 15 18:37:31.783: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 0 nr = 1 i = 0x430280000A6808C000000000000000 *Jan 15 18:37:31.783: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 1 *Jan 15 18:37:31.783: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 1 nr = 1 i = 0x4302000006660500FFFFFF00 *Jan 15 18:37:31.787: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 2 *Jan 15 18:37:31.803: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 1 nr = 2 i = 0x430280000B660500FFFFFF00 *Jan 15 18:37:31.803: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 2 *Jan 15 18:37:33.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4097) *Jan 15 18:37:33.527: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:33.527: UDP src=3000, dst=3000 *Jan 15 18:37:33.535: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4242) *Jan 15 18:37:33.539: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4242) *Jan 15 18:37:34.539: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4243) *Jan 15 18:37:34.539: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4243) *Jan 15 18:37:35.283: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 2 nr = 2 i =

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0x4302000008670500000000000 *Jan 15 18:37:35.283: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr =
3 *Jan 15 18:37:35.283: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 2 nr = 3 i =
0x4302800009670500000000000 *Jan 15 18:37:35.287: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr =
3 *Jan 15 18:37:36.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx
ECHO_REQ(tid=4098) *Jan 15 18:37:36.527: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending *Jan 15 18:37:36.527: UDP src=3000, dst=3000 *Jan 15
18:37:36.539: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4244)
*Jan 15 18:37:36.539: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx
ECHO_ACK(tid=4244) NAS1# NAS1#undebug all All possible debugging has been turned off NAS1#show
rlm group 0 RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM Version : 2 Link State: Up
Last Link Status Reported: Server_Switched !--- Indicates the link change caused by the switch-
over. Next tx TID: 2 Last rx TID: 0 Server Link Group[sc1]: Last Reported Priority: LOW link
[172.16.13.141(FastEthernet0), 172.16.13.132] = socket[standby] Server Link Group[sc3]: Last
Reported Priority: HIGH link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[active] RLM
Group 0 Timer Values open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up
= 60s retransmit = 1s keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan
15 18:37:21.767, total transition=2 avg=01:10:30.132, max=01:10:30.132, min=00:00:00.000,
latest=01:10:30.132 Link_down: last time occurred at *Jan 15 17:26:15.635, total transition=1
avg=00:00:36.000, max=00:00:36.000, min=00:00:00.000, latest=00:00:36.000 Link_recovered: last
time occurred at *Jan 15 18:37:21.767, success=1(100%), failure=0 avg=0.000s, max=0.000s,
min=0.000s, latest=0.000s Link_switched: last time occurred at none, success=0(0%), failure=0
avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at *Jan 15
18:37:21.767 for totally 1 times Server Link Group[sc1]: Open the link
[172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 15 17:26:45.635,
success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link
[172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 15 18:38:17.527,
success=4111(99%), failure=15 avg=0.000s, max=0.068s, min=0.000s, latest=0.000s Server Link
Group[sc3]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at
*Jan 15 17:26:45.635, success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s,
latest=3.000s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred
at *Jan 15 18:38:17.543, success=4284(99%), failure=1 avg=0.000s, max=0.068s, min=0.000s,
latest=0.000s NAS1#show isdn status Global ISDN Switchtype = primary-ni ISDN Serial0:23
interface rlm-group = 0 dsl 0, interface ISDN Switchtype = primary-ni : Primary D channel of
nfas group 0 Layer 1 Status: ACTIVE Layer 2 Status: TEI = 0, Ces = 1, SAPI = 0, State =
MULTIPLE_FRAME_ESTABLISHED Layer 3 Status: 0 Active Layer 3 Call(s) Active dsl 0 CCBs = 0 The
Free Channel Mask: 0x80FFFFFF Total Allocated ISDN CCBs = 0 NAS1#
```

确定问题的本质然后离析问题特定设备或组件排除故障。请使用这些工具隔离问题：

- MML发出命令获取报警报告的，配置，并且执行呼叫跟踪。
- 查看系统日志文件(/opt/CiscoMGC/var/log/platform.log)提示的向问题。
- 打开在PGW2200的**调试**模式某些进程的(例如引擎或ISDN PRI在IP [PRIIP])。
- 请使用刺探者工具到嗅探器在PGW2200和NAS网关之间的IP数据包。

请使用mml命令**rtrv-alms**查看系统体验的所有报警。更多有用的命令使用是**rtrv-alms ： ：**不断地细听报告的任何当前报警的**cont**。多数有用的信息是platform.log文件在/opt/CiscoMGC/var/log/目录下。此文件包含从系统的所有信息。因为此文件也许非常大，请使用unix命令**grep**通过文件搜索和解析。

搜索的关键字排除故障ISDN和RLM是IOCC-PRIIP，是PRIIP的输入/输出信道控制器。另一个方法将使用**tail - f platform.log**在/opt/CIscoMGC/var/log/目录下不断地监控在实时出现的所有错误消息。您能设置在调试模式的PGW2200。设置PRIIP进程到调试模式和看起来深到在PGW2200内的数据包流。

您能使用的另一个工具是思科刺探者。它能监控(在实时)运行IP的不同种类的协议(例如， RLM、SS7、ISDN和H.225)。它是类似嗅探器连接以太网段监控所有流量类型。使用思科刺探者工具，本文不报道故障排除程序。

这是从PGW2200的若干示例输出。在正常操作，有NAS网关和PGW2200之间的不变通信。保活信息在PGW2200可以监控。使PGW2200有在调试模式的PRIIP进程与mml命令**set-log:prrip-**

01:debug,confirm。

sc1 mml>**rtrv-ne** MGC-01 - Media Gateway Controller 2002-01-15 21:48:14 M RTRV "Type:MGC" "Hardware platform:sun4u sparc SUNW,Ultra-60" "Vendor:"Cisco Systems, Inc."" "Location:MGC-01 - Media Gateway Controller" "Version:"7.4(11)"" "Platform State:ACTIVE" ; sc1 mml>**help:set-log** MGC-01 - Media Gateway Controller 2002-01-15 21:48:26 M RTRV SET-LOG -- Set Logging Levels ---------- Purpose: This MML command is used to set the logging level of a process or all processes. Format: set-log:: set-log:all: Input * proc -- The various actively and passively monitored Description: processes running on the MGC. Use the RTRV-SOFTW:ALL command to display all processes. * log level -- Sets the logging level for the specified process. Logging levels are as follows: - CRIT -- Critical level messages. - ERR -- Error condition messages. - WARN -- Warning condition messages. - INFO -- Informational messages. - TRACE -- Trace messages. - DEBUG -- Debug-level messages (lowest level). A CONFIRM parameter is required for the DEBUG log level. sc1 mml>**rtrv-softw:all** MGC-01 - Media Gateway Controller 2002-01-15 21:49:00 M RTRV "CFM-01:RUNNING ACTIVE" "ALM-01:RUNNING ACTIVE" "MM-01:RUNNING ACTIVE" "AMDMPR-01:RUNNING ACTIVE" "CDRDMPR-01:RUNNING ACTIVE" "DSKM-01:RUNNING IN N/A STATE" "MMDB-01:RUNNING IN N/A STATE" "POM-01:RUNNING ACTIVE" "MEASAGT:RUNNING ACTIVE" "OPERSAGT:RUNNING ACTIVE" "PROVSAGT:RUNNING ACTIVE" **"priip-1:RUNNING IN N/A STATE"** *!--- This is the process which is set !--- to debug mode.* "Replic-01:RUNNING ACTIVE" "ENG-01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>**set-log:priip-1:debug,confirm** *!--- MML command for PRIIP process !--- in debug mode.* MGC-01 - Media Gateway Controller 2002-01-15 21:49:30 M COMPLD "priip-1" ; sc1 mml>**quit**

这里，正常RLM保活信息被交换在NAS网关和PGW2200之间。

sc1% **tail -f platform.log** *!--- UNIX command used to monitor messages logged !--- to the platform.log file. !--- UPD Srv is the ECHO_REQ received from the !--- NAS gateway on UDP port 3000. !--- IoSendUdp is the ECHO_ACK sent back from the PGW 2200 to the !--- NAS gateway on UDP port 3000.* Tue Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) <Debug> UDP Srv (ff100001) 8 bytes 172.16.13.141:3000 *!--- ECHO_REQ received from the NAS gateway (172.16.13.141). !--- Note the Hex dump (02 05 00 08 38 2c 00 01) !--- 02 = RLM version 05 = echo_req 00 08 = packet length 0x382c = tid.* Tue Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) <Trace> **PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 0 (8) 02 05 00 08 38 2c 00 01** Tue Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 8 Dsl 0 IP 172.16.13.141:3000 *!--- ECHO_ACK sent back from PGW 2200 to the NAS gateway. !--- Note the Hex dump (02 06 00 08 38 2c 00 02) !--- 0x02 = RLM version 0x06 = echo_ack 0x0008 = packet length 0x382c = tid.* Tue Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) **PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 1 (8) 02 06 00 08 38 2c 00 02**

此输出是在NAS网关和PGW2200之间的正常ISDN保活信息。

!--- UPD Srv is the ISDN RRp keepalive !--- received from the NAS gateway on UDP port 3001. !--- IoSendUdp is the ISDN RRf keepalive sent back from the PGW 2200 !--- to the NAS gateway on UDP port 3001. Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug> **UDP Srv (00100001) 4 bytes 172.16.13.141:3001** Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (4) 00 01 01 0b Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT RR] Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug> **ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001** Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (4) 00 01 01 0b

这是异常ISDN信令示例。Keepalive没有由从NAS网关的PGW2200接收。

!--- This is what happens when the PGW 2200 does not !--- receive the keepalive from the NAS gateway. In this case, the D-channel !--- is shut-down on the NAS gateway. !--- Notice that the T200 timer expires. These messages appear !--- once for every time it does not receive !--- a reply back (Receiver Ready) from the NAS gateway. After some !--- time has passed, the PGW 2200 attempts to re-establish !--- the link to the NAS gateway. Wed Jan 16 16:05:55:848 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 1 EVENT T200] Wed Jan 16 16:05:55:848 2002 | priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed Jan 16 16:05:55:848 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (3) 02 01 7f Wed Jan 16 16:05:56:948 2002 | priip-1 (PID 18408) <Debug> *!--- After several of these*

messages appear without !--- a reply back from the NAS gateway, !--- the PGW 2200 marks the link as failed and !--- changes the status to OOS. !--- PROT_INFO_Q921_LNK_CNTL: Q921 channel 140001 !--- state change OOS causes a link fail. [LINK 1 24 0 STATE 1 EVENT T200] Wed Jan 16 16:05:56:948 2002 | priip-1 (PID 18408) <Debug> Received readPoll w/msgType fe Wed Jan 16 16:05:56:948 2002 | priip-1 (PID 18408) <Info> PROT_INFO_Q921_LNK_CNTL: Q921 channel 140001 state change Out-of-service cause Link fail Wed Jan 16 16:05:56:948 2002 | priip-1 (PID 18408) <Info> PROT_INFO_Q921_LNK_CNTL: Q921 channel 140001 state change Out-of-service cause Link fail

此部分是PGW2200的**调试**捕获，当D-channel带来回到在职时(未关闭)。

注意： 注释被编号，对对应的调试的一参考在NAS网关。

PGW2200调试
!--- 1. PGW 2200 receives the SABME from the NAS gateway to !--- start re-initializing the ISDN link. Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Debug> UDP Srv (00100001) 3 bytes 172.16.13.141:3001 Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (3) 00 01 7f Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 0 EVENT SABME] Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT DL_EST_RSP]

!--- 2. The PGW 2200 sends out the UA message in response !--- to the SABME it received. PGW 2200 changes the !--- link status to be In Service. Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (3) 00 01 73 Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Debug> Received readPoll w/msgType fe Wed Jan 16 17:22:50:614 2002	priip-1 (PID 18408) <Info> PROT_INFO_Q921_LNK_CNTL: Q921 channel 140001 state change In-service cause N/A Wed Jan 16 17:22:50:615 2002	priip-1 (PID 18408) <Info> PROT_INFO_Q921_LNK_CNTL: Q921 channel 140001 state change In-service cause N/A *!--- The RLM manager keepalive messages on UDP port 3000. !--- Hex 05 is ECHO_REQ and 06 is ECHO_ACK.* Wed Jan 16 17:22:50:615 2002	priip-1 (PID 18408) <Debug> UDP Srv (ff100001) 8 bytes 172.16.13.141:3000 Wed Jan 16 17:22:50:615 2002	priip-1 (PID 18408) <Trace> PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 0 (8) 02 05 00 08 48 b9 00 00 Wed Jan 16 17:22:50:615 2002	priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 8 Dsl 0 IP 172.16.13.141:3000 Wed Jan 16 17:22:50:615 2002	priip-1 (PID 18408) <Trace> PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 1 (8) 02 06 00 08 48 b9 00 02

!--- 3. PGW 2200 receives an ISDN INFOc message !--- with the RLM version defined. Wed Jan 16 17:22:50:622 2002	priip-1 (PID 18408) <Debug> UDP Srv (00100001) 19 bytes 172.16.13.141:3001 Wed Jan 16 17:22:50:622 2002	priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (19) 00 01 00 00 43 02 00 00 0a 68 08 c0 00 00 00 00 00 00 00 Wed Jan 16

```
17:22:50:622 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT I ] Wed Jan 16 17:22:50:622 2002 |
priip-1 (PID 18408) <Debug> [ LINK 1 24 0 STATE 3 EVENT
DL_DAT_RSP ] Wed Jan 16 17:22:50:622 2002 | priip-1 (PID
18408) <Debug> [ LINK 1 24 0 STATE 3 EVENT ACK_PEND ]
```

```
!--- 4. PGW 2200 sends out an ISDN Receiver Ready (RR)
!--- keepalive message to the NAS gateway. Wed Jan 16
17:22:50:622 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed
Jan 16 17:22:50:622 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 02
```

```
!--- 5. PGW 2200 checks the signal link to the NAS !---
gateway and it is not available. !--- PGW 2200 replies
back to the previous ISDN INFOc message !--- with a BAD
PACKET message and a !--- Cause i = 0x83A9 - Temporary
failure. Wed Jan 16 17:22:50:622 2002 | priip-1 (PID
18408) <Debug> Idu (430a len 15) from path 140001 CallId
0000 Wed Jan 16 17:22:50:629 2002 | engine (PID 18400)
<Error> CP_ERR_SIGPATH_NOTAVAIL:
cmgCallMgr::forwardNetEvent: sigpath signas1[00140001]
not available Wed Jan 16 17:22:50:639 2002 | priip-1
(PID 18408) <Debug> ----> PACKET for 140001 <----- Wed
Jan 16 17:22:50:639 2002 | priip-1 (PID 18408) <Debug>
<< Info (9)>> 43 02 80 00 5a 08 02 83 a9 << !--- Cause
code 0x83A9 - Temporary failure. Wed Jan 16 17:22:50:639
2002 | priip-1 (PID 18408) <Debug> [ LINK 1 24 0 STATE 3
EVENT DL_DAT_REQ ] Wed Jan 16 17:22:50:639 2002 | priip-
1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP
172.16.13.141:3001 Wed Jan 16 17:22:50:639 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 1 (13) 02 01 00 02 43 02 80 00 5a
08 02 83 a9
```

```
!--- 6. PGW 2200 receives a keepalive RR message !---
from the NAS gateway. Wed Jan 16 17:22:50:643 2002 |
priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes
172.16.13.141:3001 Wed Jan 16 17:22:50:643 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 0 (4) 02 01 01 02 Wed Jan 16
17:22:50:643 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT RR ] !--- The RLM manager keepalive
messages on UDP port 3000. !--- Hex 05 is ECHO_REQ and
06 is ECHO_ACK. Wed Jan 16 17:22:52:614 2002 | priip-1
(PID 18408) <Debug> UDP Srv (ff100001) 8 bytes
172.16.13.141:3000 Wed Jan 16 17:22:52:615 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_RLM_PDU: Hex dump of
RLM messages ff100001 0 (8) 02 05 00 08 48 ba 00 02 Wed
Jan 16 17:22:52:615 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server fd 8 Dsl 0 IP 172.16.13.141:3000 Wed
Jan 16 17:22:52:615 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 1
(8) 02 06 00 08 48 ba 00 02 (…..skipped another set RLM
keepalive packets)
```

!--- 7. PGW 2200 sent an ISDN INFOc message with the RLM version. Wed Jan 16 17:22:53:749 2002 | priip-1 (PID 18408) <Debug> ----> PACKET for 140001 <----- Wed Jan 16 17:22:53:749 2002 | priip-1 (PID 18408) <Debug> << Info (15)>> 43 02 00 00 0a 68 08 c0 00 00 00 00 00 00 00 << Wed Jan 16 17:22:53:749 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT DL_DAT_REQ] Wed Jan 16 17:22:53:749 2002 | priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed Jan 16 17:22:53:749 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (19) 02 01 02 02 43 02 00 00 0a 68 08 c0 00 00 00 00 00 00 00

!--- 8. PGW 2200 receives a keepalive RR message !--- from the NAS gateway. Wed Jan 16 17:22:53:753 2002 | priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes 172.16.13.141:3001 Wed Jan 16 17:22:53:753 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (4) 02 01 01 04 Wed Jan 16 17:22:53:753 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT RR]

!--- 9. PGW 2200 receives an ISDN INFOc message !--- with the RLM version number from the NAS gateway. Wed Jan 16 17:22:53:756 2002 | priip-1 (PID 18408) <Debug> UDP Srv (00100001) 19 bytes 172.16.13.141:3001 Wed Jan 16 17:22:53:756 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (19) 00 01 02 04 43 02 80 00 0a 68 08 c0 00 00 00 00 00 00 00 Wed Jan 16 17:22:53:756 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT I] Wed Jan 16 17:22:53:756 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT DL_DAT_RSP] Wed Jan 16 17:22:53:756 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3 EVENT ACK_PEND]

!--- 10. PGW 2200 sends out an ISDN RR keepalive !--- message to the NAS gateway. Wed Jan 16 17:22:53:757 2002 | priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed Jan 16 17:22:53:757 2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (4) 00 01 01 04

!--- 11. PGW 2200 sends out RESYNC REQ to the NAS gateway !--- to sync up the bearer channel status. Wed Jan 16 17:22:53:757 2002 | priip-1 (PID 18408) <Debug> Idu (430a len 15) from path 140001 CallId 8000 Wed Jan 16 17:22:54:269 2002 | priip-1 (PID 18408) <Debug> ----> PACKET for 140001 <----- Wed Jan 16 17:22:54:269 2002 | priip-1 (PID 18408) <Debug> << Info (12)>> 43 02 00 00 08 67 05 00 00 00 00 00 << Wed Jan 16 17:22:54:269 2002 | priip-1 (PID 18408) <Debug> [LINK 1 24 0 STATE 3

```
EVENT DL_DAT_REQ ] Wed Jan 16 17:22:54:269 2002 | priip-
1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1 IP
172.16.13.141:3001 Wed Jan 16 17:22:54:269 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 1 (16) 02 01 04 04 43 02 00 00 08
67 05 00 00 00 00 00
```

```
!--- 12. PGW 2200 receives a keepalive RR message !---
from the NAS gateway. Wed Jan 16 17:22:54:274 2002 |
priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes
172.16.13.141:3001 Wed Jan 16 17:22:54:274 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 0 (4) 02 01 01 06 Wed Jan 16
17:22:54:274 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT RR ]
```

```
!--- 13. PGW 2200 receives an INFOc message with RESYNC
!--- RESP from the NAS gateway !--- in reply to the
RESYNC REQ it sent to it earlier. Wed Jan 16
17:22:54:276 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 16 bytes 172.16.13.141:3001 Wed Jan 16
17:22:54:276 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(16) 00 01 04 06 43 02 80 00 09 67 05 00 00 00 00 00 Wed
Jan 16 17:22:54:276 2002 | priip-1 (PID 18408) <Debug> [
LINK 1 24 0 STATE 3 EVENT I ] Wed Jan 16 17:22:54:276
2002 | priip-1 (PID 18408) <Debug> [ LINK 1 24 0 STATE 3
EVENT DL_DAT_RSP ] Wed Jan 16 17:22:54:276 2002 | priip-
1 (PID 18408) <Debug> [ LINK 1 24 0 STATE 3 EVENT
ACK_PEND ]
```

```
!--- 14. PGW 2200 sends out an ISDN RR keepalive !---
message to the NAS gateway. Wed Jan 16 17:22:54:276 2002
| priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl
1 IP 172.16.13.141:3001 Wed Jan 16 17:22:54:276 2002 |
priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex
dump of Q921 messages 100001 1 (4) 00 01 01 06
(….skipped several RLM link keepalive message with UDP
port 3000)
```

```
!--- 15. PGW 2200 receives an INFOc message with a !---
Group Service Message (GSM) !--- which indicates the
status of each of the timeslots !--- within the T1 line.
In this GSM message, !--- the NAS gateway indicates that
the nfas_int 00 (first t1 !--- controller within the
nfas group) has !--- all the timeslots OOS (0). The
first octet (00) indicates !--- the nfas_int with the
nfas group. !--- The last four octets represent the
timeslots for that nfas_int (T1 controller). !--- 0
means the timeslot is OOS. !--- 1 means the timeslot is
In-Service. Wed Jan 16 17:22:58:618 2002 | priip-1 (PID
18408) <Debug> UDP Srv (00100001) 16 bytes
172.16.13.141:3001 Wed Jan 16 17:22:58:618 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
```

```
Q921 messages 100001 0 (16) 00 01 06 06 43 02 00 00 06
66 05 00 00 00 00 00 Wed Jan 16 17:22:58:618 2002 |
priip-1 (PID 18408) <Debug> [ LINK 1 24 0 STATE 3 EVENT
I ] Wed Jan 16 17:22:58:618 2002 | priip-1 (PID 18408)
<Debug> [ LINK 1 24 0 STATE 3 EVENT DL_DAT_RSP ] Wed Jan
16 17:22:58:618 2002 | priip-1 (PID 18408) <Debug> [
LINK 1 24 0 STATE 3 EVENT ACK_PEND ]
```

```
!--- 16. PGW 2200 sends out an ISDN RR keepalive message
!--- to the NAS gateway. Wed Jan 16 17:22:58:618 2002 |
priip-1 (PID 18408) <Debug> ioSendUdp: Server fd 9 Dsl 1
IP 172.16.13.141:3001 Wed Jan 16 17:22:58:618 2002 |
priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex
dump of Q921 messages 100001 1 (4) 00 01 01 08
```

```
!--- 17. The PGW 2200 replies back to the GSM message !-
-- from the NAS gateway !--- with a Group Service
Acknowledgment message with the same !--- information
the NAS sent. !--- The PGW 2200 acknowledges the status
for each of the timeslots within !--- the nfas_int in
the nfas group. Wed Jan 16 17:22:58:618 2002 | priip-1
(PID 18408) <Debug> Idu (4306 len 12) from path 140001
CallId 0000 Wed Jan 16 17:22:58:639 2002 | priip-1 (PID
18408) <Debug> ----> PACKET for 140001 <----- Wed Jan 16
17:22:58:639 2002 | priip-1 (PID 18408) <Debug> << Info
(12)>> 43 02 80 00 0b 66 05 00 00 00 00 00 <<Wed Jan 16
17:22:58:639 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT DL_DAT_REQ ]Wed Jan 16 17:22:58:639
2002 | priip-1 (PID 18408) <Debug>ioSendUdp: Server fd 9
Dsl 1 IP 172.16.13.141:3001Wed Jan 16 17:22:58:639 2002
| priip-1 (PID 18408) <Trace>PROT_TRACE_Q921_PDU: Hex
dump of Q921 messages 100001 1 (16) 02 01 06 08 43 02 80
00 0b 66 05 00 00 00 00 00
```

```
!--- 18. PGW 2200 receives a keepalive RR !--- message
from the NAS gateway. Wed Jan 16 17:22:58:643 2002 |
priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes
172.16.13.141:3001 Wed Jan 16 17:22:58:643 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 0 (4) 02 01 01 08 Wed Jan 16
17:22:58:644 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT RR ]
```

```
!--- 19. PGW 2200 receives an INFOc message with GSM !--
- which indicates the status of each of the timeslots !-
-- within the T1 line. In this GSM message, the NAS !---
gateway indicates that the nfas_int 00 (first t1
controller !--- within the nfas group) has all the !---
timeslot statuses as IN SERVICE(1). The NAS gateway !---
instructs the PGW 2200 to place those !--- timeslots
(CIC) IN SERVICE. The first octet (00) indicates !---
the nfas_int with the nfas group. !--- The last four
octets represent the timeslots for !--- that nfas_int
(T1 controller). !--- 0 means the timeslot is OOS. !---
```

```
1 means the timeslot is In-Service. !--- Therefore, (ff
ff ff 00) where each "f" represents four timeslots !---
to be In-Service. The last octet (00) is !--- only
useful in the E1 scenario. Wed Jan 16 17:22:58:647 2002
| priip-1 (PID 18408) <Debug> UDP Srv (00100001) 16
bytes 172.16.13.141:3001 Wed Jan 16 17:22:58:647 2002 |
priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex
dump of Q921 messages 100001 0 (16) 00 01 08 08 43 02 00
00 06 66 05 00 ff ff ff 00 Wed Jan 16 17:22:58:647 2002
| priip-1 (PID 18408) <Debug>[ LINK 1 24 0 STATE 3 EVENT
I ]Wed Jan 16 17:22:58:647 2002 | priip-1 (PID 18408)
<Debug>[ LINK 1 24 0 STATE 3 EVENT DL_DAT_RSP ] Wed Jan
16 17:22:58:647 2002 | priip-1 (PID 18408) <Debug>[ LINK
1 24 0 STATE 3 EVENT ACK_PEND ]
```

```
!--- 20. The PGW 2200 sends out an ISDN RR keepalive !--
- message to the NAS gateway. Wed Jan 16 17:22:58:647
2002 | priip-1 (PID 18408) <Debug> ioSendUdp: Server fd
9 Dsl 1 IP 172.16.13.141:3001 Wed Jan 16 17:22:58:647
2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU:
Hex dump of Q921 messages 100001 1 (4) 00 01 01 0a
```

```
!--- 21. The PGW 2200 prepares to send back an !---
acknowledgement to the GSM message its !--- received
from the NAS gateway. It sends out a Group Service !---
Acknowledgement (GSM ACK) with 00FFFFFF00. !--- The
first 00 is the nfas_int. The FFFFFF is the status of !-
-- each channel within the nfas_int. !--- Each F
represents four timeslots. Wed Jan 16 17:22:58:647 2002
| priip-1 (PID 18408) <Debug> Idu (4306 len 12) from
path 140001 CallId 0000 Wed Jan 16 17:22:58:649 2002 |
engine (PID 18400) <Error> CP_ERR_PAIR:
cmgSs7Adapter::setChanAsOrigLeg: mate manual block
prevents call initiation: CIC=1 for sigpath dpc-
sc2200[00130002] Wed Jan 16 17:22:58:659 2002 | priip-1
(PID 18408) <Debug> ----> PACKET for 140001 <----- Wed
Jan 16 17:22:58:659 2002 | priip-1 (PID 18408) <Debug>
<< Info (12)>> 43 02 80 00 0b 66 05 00 ff ff ff 00 <<
Wed Jan 16 17:22:58:659 2002 | priip-1 (PID 18408)
<Debug> [ LINK 1 24 0 STATE 3 EVENT DL_DAT_REQ ] Wed Jan
16 17:22:58:659 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server fd 9 Dsl 1 IP 172.16.13.141:3001 Wed
Jan 16 17:22:58:659 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(16) 02 01 08 0a 43 02 80 00 0b 66 05 00 ff ff ff 00 !--
- The PGW 2200 receives a keepalive RR message from the
NAS gateway. Wed Jan 16 17:22:58:663 2002 | priip-1 (PID
18408) <Debug> UDP Srv (00100001) 4 bytes
172.16.13.141:3001 Wed Jan 16 17:22:58:663 2002 | priip-
1 (PID 18408) <Trace> PROT_TRACE_Q921_PDU: Hex dump of
Q921 messages 100001 0 (4) 02 01 01 0a Wed Jan 16
17:22:58:664 2002 | priip-1 (PID 18408) <Debug> [ LINK 1
24 0 STATE 3 EVENT RR ] sc1%
```

此命令输出是前面的命令输出的重复项从NAS侧的。注意对应的被编号的注释。

NAS

```
NAS1#show debug ISDN: ISDN Q921 packets debugging is on
```

```
ISDN Q931 packets debugging is on ISDN Q921 packets
debug DSLs. (On/Off/No DSL:1/0/-) DSL 0 --> 7 1 - - - -
- - - ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-
) DSL 0 --> 7 1 - - - - - - - NAS1#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z. NAS1(config)#interface s0:23 NAS1(config-if)#no
shut NAS1(config-if)# Jan 16 17:02:45.310: %CSM-5-PRI:
add PRI at slot 0, unit 0, channel 23 with index 0 Jan
16 17:02:47.310: %LINK-3-UPDOWN: Interface Serial0:23,
changed state to up Jan 16 17:02:47.310: ISDN Se0:23 SC:
TX -> SABMEp c/r = 0 sapi = 0 tei = 0 !--- 1. The NAS
tries to re-establish the ISDN link. Jan 16
17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0 sapi = 0
tei = 0
```

```
!--- 2. The PGW 2200 responds back to the SABME. Jan 16
17:02:47.314: %ISDN-6-LAYER2UP: Layer 2 for Interface
Se0:23 SC, TEI 0 changed to up Jan 16 17:02:47.318: ISDN
Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 0 nr = 0 i
= 0x430200000A6808C000000000000000 Jan 16 17:02:47.318:
VERSION pd = 67 callref = 0x0000
```

```
!--- 3. The NAS sends the RLM version number to the PGW
2200. Jan 16 17:02:47.318: Version info i =
0xC000000000000000 Jan 16 17:02:47.322: ISDN Se0:23 SC:
RX <- RRr sapi = 0 tei = 0 nr = 1
```

```
!--- 4. The NAS receives the ISDN keepalive from the PGW
2200. Jan 16 17:02:47.338: ISDN Se0:23 SC: RX <- INFOc
sapi = 0 tei = 0 ns = 0 nr = 1 i = 0x430280005A080283A9
Jan 16 17:02:47.338: BAD
PACKET(0x02010002430280005A080283A9)pd = 67 callref =
0x8000 Jan 16 17:02:47.338: Cause i = 0x83A9 - Temporary
failure
```

```
!--- 5. The PGW 2200 replies back to the NAS. Its signal
is still down. Jan 16 17:02:47.342: ISDN Se0:23 SC: TX -
> RRr sapi = 0 tei = 0 nr = 1
```

```
!--- 6. NAS sends out the ISDN keepalive message. Jan 16
17:02:50.450: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei =
0 ns = 1 nr = 1 i = 0x430200000A6808C000000000000000 Jan
16 17:02:50.450: VERSION pd = 67 callref = 0x0000
```

```
!--- 7. The PGW 2200 sends the RLM version it used to
the NAS. Jan 16 17:02:50.450: Version info i =
0xC000000000000000 Jan 16 17:02:50.450: ISDN Se0:23 SC:
TX -> RRr sapi = 0 tei = 0 nr = 2
```

!--- 8. The NAS sends out another ISDN keepalive message. Jan 16 17:02:50.450: ISDN Se0:23 SC :Received msg 10 from SC Jan 16 17:02:50.454: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 1 nr = 2 i = 0x430280000A6808C000000000000000 Jan 16 17:02:50.454: VERSION pd = 67 callref = 0x8000

!--- 9. The NAS sends out the RLM version to the PGW 2200 again. Jan 16 17:02:50.454: Version info i = 0xC000000000000000 Jan 16 17:02:50.454: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 2

!--- 10. The NAS receives the ISDN keepalive message from the PGW 2200. Jan 16 17:02:50.970: ISDN Se0:23 SC: RX <- INFOc sapi = 0 tei = 0 ns = 2 nr = 2 i = 0x4302000008670500000000000 Jan 16 17:02:50.970: RESYNC REQ pd = 67 callref = 0x0000

!--- 11. The PGW 2200 sends the NAS a RESYNC message to sync up !--- the timeslot (CIC) status. Jan 16 17:02:50.970: Channel Status i = 0x0000000000 Jan 16 17:02:50.970: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 3

!--- 12. The NAS sends out the ISDN keepalive message to the PGW 2200. Jan 16 17:02:50.970: ISDN Se0:23 SC :Received msg 8 from SC Jan 16 17:02:50.974: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 2 nr = 3 i = 0x4302800009670500000000000 Jan 16 17:02:50.974: RESYNC RESP pd = 67 callref = 0x8000

!--- 13. The NAS responds back to the RESYNC message. . Jan 16 17:02:50.974: Channel Status i = 0x0000000000 Jan 16 17:02:50.974: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 3

!--- 14. The NAS receives the ISDN keepalive message from the PGW 2200. Jan 16 17:02:55.314: Re-send Group Service Message: Counter 0 Jan 16 17:02:55.314: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 3 nr = 3 i = 0x4302000006660500000000000 Jan 16 17:02:55.314: GROUP SERVICE pd = 67 callref = 0x0000

!--- 15. The NAS sends out GSM to inform the PGW 2200 of the channel. Jan 16 17:02:55.314: Interface Service i = 0x0000000000 status. 1st octet indicate nfas_int and "0"

```
= OOSJan 16 17:02:55.318: ISDN Se0:23 SC: RX <- RRr sapi
= 0 tei = 0 nr = 4
```

```
!--- 16. The NAS receives the ISDN keepalive message
from the PGW 2200. Jan 16 17:02:55.338: ISDN Se0:23 SC:
RX <- INFOc sapi = 0 tei = 0 ns = 3 nr = 4 i =
0x430280000B66050000000000 Jan 16 17:02:55.338: GROUP
SERVICE ACK pd = 67 callref = 0x8000
```

```
!--- 17. The PGW 2200 acknowledges the channel status
report by the NAS. Jan 16 17:02:55.338: Interface
Service i = 0x0000000000 Jan 16 17:02:55.342: ISDN
Se0:23 SC: TX -> RRr sapi = 0 tei = 0 nr = 4
```

```
!--- 18. The NAS sends out the ISDN keepalive message.
Jan 16 17:02:55.342: ISDN Se0:23 SC :Received msg 11
from SC Jan 16 17:02:55.342: ISDN Se0:23 SC: TX -> INFOc
sapi = 0 tei = 0 ns = 4 nr = 4 i =
0x43020000066660500FFFFFF00 Jan 16 17:02:55.342: GROUP
SERVICE pd = 67 callref = 0x0000
```

```
!--- 19. The NAS sends out the GSM to the PGW 2200 to !-
-- set the T1 0 timeslots (t/s). Jan 16 17:02:55.342:
Interface Service i = 0x00FFFFFF In-Service. "00" is
nfas_int "FFFFFF" is t/s 1-24 Jan 16 17:02:55.346: ISDN
Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 5
```

```
!--- 20. The NAS receives the ISDN keepalive message
from the PGW 2200. Jan 16 17:02:55.358: ISDN Se0:23 SC:
RX <- INFOc sapi = 0 tei = 0 ns = 4 nr = 5 i =
0x430280000B660500FFFFFF00 Jan 16 17:02:55.358: GROUP
SERVICE ACK pd = 67 callref = 0x8000
```

```
!--- 21. The PGW 2200 acknowledges the GSM channel
status for each. Jan 16 17:02:55.358: Interface Service
i = 0x00FFFFFF00 of the timeslots to be In-Service. Jan
16 17:02:55.362: ISDN Se0:23 SC: TX -> RRr sapi = 0 tei
= 0 nr = 5 Jan 16 17:02:55.362: ISDN Se0:23 SC :Received
msg 11 from SC NAS1(config-if)# NAS1(config-if)#
```

RESYNC_REQ/RESYNC_RESP

RESYNC_REQ/RESYNC_RESP消息使用到检查点在PGW2200和NASes之间的呼叫状态。这些消息典型地生成，在一个转换事件确定后任何差异是否在呼叫状态发生。这些消息用于重新建立信道呼叫状态的统一的视图PGW2200和NAS网关的防止所有可能的暂停CIC。

组服务消息

类似于再同时消息，组服务消息使用单个消息每D-channel指示服务状态(IS/OOS)所有相关的B信道。NAS发起组服务操作。行动在PGW2200侧采取维护根据比较每个信道的状态结果的信道状态的一致性。当PGW2200收到此消息时，派出SS7 ISUP电路组块(CGB/CGBA)和电路组取消阻止(CGU/CGUA)对应于从组服务消息的B信道服务征兆。另外，对组服务消息的确认从NAS不发生，直到信令网关接收一CGBA或CGUA从PSTN交换机。

在Cisco SS7互连语音网关解决方案配置，从的承载信道NAS被联接(固定)到SS7持票人。前面，PGW2200引擎通过设置承载信道服务状态处理了每个人NAS服务消息。当在的许多信道NAS同时时更改状态，发生的服务消息能充斥交换机，如果他们单个发送。从NAS传送的组服务消息高效地通知引擎所有承载信道的状态。引擎必须解码此消息，更改每条NI-2承载信道的状态和传播对SS7侧的更改，必须传送对应的块和取消阻止信道管理信息(CGB/CGBA和CGU/CGUA)。这允许最大效率。此Group Service Message (GSM)帮助最小化SERVICE/SERVICE ACK消息处理数量在超过被采取到在服务范围外或在职的一个信道(或接口情形下)。组服务消息能每次处理三十个接口。

如果遇到任何问题，请收集SS7/NI2+ RLM嗅探器跟踪：

- **收集snoop/NI2+/RLM/-SS7嗅探器跟踪**

此部分列出收集的嗅探器跟踪几个方法。哪个您选择取决于您是否安排Cisco分组电话中心监测与排障(PTC-MT)安装或运行思科刺探者旧版本。Cisco刺探者能给一好了解SS7-SIP呼叫流。

- 您能发出**snoop命令**在所有Solaris平台。登陆作为超级用户并且发出此命令收集UNIX**监听**信息：

  snoop -o snoop.log *IP address* Ctrl C - to exit snoop 上传snoop.log文件对案例注释。**注意：** 解释在案例注释此文件通过**snoop命令**使用的UNIX捕获。
- 运行思科刺探者应用程序。登陆作为超级用户并且发出**list命令./snooper int接口的PARMS**或运行**./snooper**收集Cisco刺探者信息，给予您完整说明。

  ./snooper int hme'x' ni2+ rlm ss7 > snooper_int1 *!--- Where 'x' is the interface number, which you can also find !--- by issuing the* ***ifconfig -a*** *command.* 上传snooper_int1文件对案例注释。
- 运行PTC-MT。为了收集PTC-MT信息，请登陆作为超级用户并且发出**list命令./ptcmt int接口的PARMS**或运行**./snooper**，给予您完整说明。

  ./ptcmt int hme'x' ni2+ rlm ss7 > snooper_int1 *!--- Where 'x' is the interface number, which you can also find !--- by issuing the* ***ifconfig -a*** *command.* 上传snooper_int1文件对案例注释。
- 在Cisco IOS NAS上，请发出IOS show isdn status命令、**show rlm group 'x'**和**debug isdn q931**。

PGW2200和NAS故障排除情况

此部分为Cisco PGW 2200提供细节和故障排除情况与Cisco NAS的组合。

以太网和快速以太网下来在Cisco NAS

发出mml命令**rtrv-alms**在Cisco PGW 2200发现失败的原因。在此方案中，以太网和快速以太网下降在NAS主机名v5300-2。这导致是的'signas1'不可得到的。

```
PGW2200a mml> rtrv-alms MGC-02 - Media Gateway Controller 2004-07-29 05:14:38.471 GMT M RTRV
"iplnk1-v5300-2: 2004-07-29 05:06:05.870 GMT,ALM=\"SC FAIL\",SEV=MJ" "iplnk2-v5300-2: 2004-07-29
05:05:06.671 GMT,ALM=\"SC FAIL\",SEV=MJ" "signas1: 2004-07-29 05:06:05.871
GMT,ALM=\"FAIL\",SEV=MJ" ; PGW2200a mml>
```

在这种情况下Cisco NAS v5300-2的以太网和快速以太网在关闭模式，并且两个插槽关闭。

```
V5300-2#show RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM WATCHER: RLM Version : 2
Link State: Down Last Link Status Reported: Down Next tx TID: 0 Last rx TID: 0 Server Link
Group[demask]: Last Reported Priority: LOW link [10.48.85.187(FastEthernet0), 10.48.85.24] =
socket[closed] link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[closed] Server Link
Group[mgc-bru-3a]: Last Reported Priority: HIGH link [10.48.85.187(FastEthernet0), 10.48.85.65]
= socket[closed] link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[closed] RLM Group 0 Timer
Values open_wait = 3s force-down = 30s recovery = 16s switch-link = 10s minimum-up = 60s
retransmit = 2s keepalive = 2s
```

您能检查platform.log错误消息在/opt/CiscoMGC/var/log目录下通过unix命令的此。进一步Cisco PGW 2200错误消息信息，参考日志消息文档。

```
tail -f platform.log Thu Jul 29 05:27:40:190 2004 GMT | priip-1 (PID 16498) <Error>
PROT_ERR_RLM_DATA_RCV: No data received for RLM link iplnk1-v5300-2[00100001] Thu Jul 29
05:27:41:060 2004 GMT | priip-1 (PID 16498) <Error> PROT_ERR_RLM_DATA_RCV: No data received for
RLM link iplnk2-v5300-2[00100002] Thu Jul 29 05:27:43:662 2004 GMT | engine (PID 16491) <Error>
CP_ERR_GET_SIGPATH_FOR_CALLSIDE: cmgProtocolAdapter::newCall: UCID=00000003, OSigPath=00150001,
OTG=*NA*, OSPAN=*NA*, OTS/CIC=1, TSigPath=00140001, TTG=*NA*, TSPAN=*NA*, TTS/CIC=0, : failed to
get sigPath for callside 2 !--- Note: OSigPath = 00150001 are the "ss7path". !---
TSigPath=00140001 are the "iplnk1-v5300-2", "iplnk2-v5300-2" - "signas1" Thu Jul 29 05:27:43:662
2004 GMT | engine (PID 16491) <Error> CP_ERR_BC_INSV: cmgProtocolAdapter::setChanAsTermLeg:
UCID=00000003, OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=1, TSigPath=00140001, TTG=*NA*,
TSPAN=0, TTS/CIC=1, Bear channel is not inservice Thu Jul 29 05:31:06:712 2004 GMT | engine (PID
16491) <Error> CP_ERR_MAN_BC_BLK: cmgProtocolAdapter::setChanAsTermLeg: UCID=00000004,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=1, TSigPath=00140001, TTG=*NA*, TSPAN=0,
TTS/CIC=1, Bear channel is manual blocked !--- Note: The RLM link goes down and SS7 - !---
Circuit Group Blocking Message (CBG) !--- messages are sent.
```

在活动链路的IP连通性问题- “林克恢复了”消息

```
V5300-2#show rlm group 0 RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM WATCHER: RLM
Version : 2 Link State: Up Last Link Status Reported: Up Next tx TID: 1 Last rx TID: 0 Server
Link Group[demask]: Last Reported Priority: LOW link [10.48.85.187(FastEthernet0), 10.48.85.24]
= socket[standby] link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby] Server Link
Group[mgc-bru-3a]: Last Reported Priority: HIGH link [10.48.85.187(FastEthernet0), 10.48.85.65]
= socket[active] link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[standby]
```

在这种情况下FastEthernet0是活动链路。然而，在某一瞬间，有IP连通性和电缆问题。这导致在Cisco PGW 2200的此消息patform.log的：

```
Thu Jul 29 06:21:25:840 2004 GMT | priip-1 (PID 16498) <Error>
PROT_ERR_RLM_DATA_RCV: No data received for RLM link iplnk2-v5300-2[00100002]
```

在IOS网关上，有此消息：

```
Jul 18 11:35:03.931: %ISDN-4-RLM_STATUS_CHANGE: ISDN SC
Se0:15 SC: Status Changed to: Link Recovered
```

请使用**show rlm group 0命令**查看Ethernet0和发现它当前在活动链路。

```
V5300-2#show rlm group 0 RLM Group 0 Status User/Port: RLM_MGR/3000 ISDN/3001 RLM WATCHER: RLM
Version : 2 Link State: Up Last Link Status Reported: Up_Recovered Next tx TID: 2 Last rx TID: 0
Server Link Group[demask]: Last Reported Priority: LOW link [10.48.85.187(FastEthernet0),
10.48.85.24] = socket[closed] link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby]
Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH link [10.48.85.187(FastEthernet0),
10.48.85.65] = socket[closed] link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[active]
```

ios命令**调试rlm组0**提供细节，当问题出现时。

```
V5300-2#debug rlm group ? <0-255> rlm group number event debug rlm event packet debug rlm packet
<cr> Jul 18 12:21:19.516: rlm 0: [State_Up, rx ACTIVE_LINK_BROKEN] over link
[10.48.85.187(FastEthernet0), 10.48.85.65] Jul 18 12:21:19.516: rlm 0: link
```

```
[10.48.84.187(Ethernet0), 10.48.84.65] tx START_REQ(tid=3) Jul 18 12:21:19.520: rlm 0: link
[10.48.84.187(Ethernet0), 10.48.84.65] requests activation Jul 18 12:21:19.520: rlm 0: link
[10.48.85.187(FastEthernet0), 10.48.85.65] is deactivated Jul 18 12:21:19.524: rlm 0: link
[10.48.84.187(Ethernet0), 10.48.84.65] rx START_ACK(tid=3) Jul 18 12:21:19.524: rlm 0:
[State_Recover, rx START_ACK] over link [10.48.84.187(Ethernet0), 10.48.84.65] Jul 18
12:21:19.524: %ISDN-4-RLM_STATUS_CHANGE: ISDN SC Se0:15 SC: Status Changed to: Link Recovered.
```

检查Cisco PGW 2200报警状态用**rtrv-alms命令**。

```
PGW2200a mml>rtrv-alms MGC-02 - Media Gateway Controller 2004-07-29 06:25:29.451 GMT M RTRV
"iplnk2-v5300-2: 2004-07-29 06:21:26.180 GMT,ALM=\"SC FAIL\",SEV=MJ" ; PGW2200a mml>
```

相关信息

- Cisco PGW 2200 Softswitch技术说明
- Cisco 信令控制器技术文档
- 语音技术支持
- 语音和统一通信产品支持
- Cisco IP 电话故障排除
- 技术支持和文档 - Cisco Systems

相关的思科支持社区讨论

思科支持社区是提出和解答问题、分享建议以及与同行协作的论坛。

有关本文档中所用的规则信息，请参阅 Cisco Technical Tips Conventions 。

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